Fields
09/518020

FILE 'REGISTRY' ENTERED AT 11:45:00 ON 05 SEP 2001
E DINITROPHENOL/CN 5
L1 2 SEA ABB=ON PLU=ON DINITROPHENOL/CN

FILE 'CAPLUS' ENTERED AT 11:45:05 ON 05 SEP 2001
L2 56 SEA ABB=ON PLU=ON EMULSAN AND (CALCOACET? OR ((RAG(W)(I OR 1) OR RAGI OR RAG1)(S)CALCOACET?))
L3 28 SEA ABB=ON PLU=ON L2 AND (L1 OR VIRAL OR ANTIGEN OR PEPTIDE OR POLYPEPTIDE OR PROTEIN OR POLYPROTEIN OR VIRUS OR BACTERI## OR FUNG## OR PARASITE OR DINITROPHENOL OR (DINITRO OR DI NITRO)(W)PHENOL OR DI NITROPHENOL OR KLH OR (KEYHOLE OR KEY HOLE)(W)LIMPET)

L3 ANSWER 1 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 2001:419033 CAPLUS
DOCUMENT NUMBER: 135:4494
TITLE: Bioengineered **emulsans**
AUTHOR(S): Trapotsis, Arthur; Panilaitis, Bruce; Guilmanov, Vladimir; Fuhrman, Juliet; Gross, Richard; Kaplan, David
CORPORATE SOURCE: Departments of Chemical and Biological Engineering, Tufts University, Medford, MA, 02155, USA
SOURCE: ACS Symp. Ser. (2001), 786(Biopolymers from Polysaccharides and Agroproteins), 240-256
CODEN: ACSMC8; ISSN: 0097-6156
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
AB A review with 32 refs. **Emulsans** are a family of lipopolysaccharides produced by the **bacterium**, Acinetobacter **calcoaceticus**. A series of studies have demonstrated that the structural features of these polymers can be manipulated by selective feeding of exogenous fatty acids or through the generation of transposon mutants deficient in fatty acid metabolic pathways. The results suggest that major shifts in fatty acids decorating the polysaccharide main chain can be achieved, leading to a family of structurally-related polymers. These changes result in significant alteration in the soln. properties of the polymers, such as in emulsification properties and crit. micelle formation. In addn., these structures can be used to explore important biomedical applications, such as vaccine adjuvants. This application was explored by macrophage activation in vitro and immunomodulation in vivo.
REFERENCE COUNT: 32
REFERENCE(S): (1) Allison, A; J Immunol Methods 1986, V95, P157 CAPLUS
(2) Belsky, I; FEBS Letts 1979, V101, P175

Searcher : Shears 308-4994

CAPLUS
(3) Donnelly, J; Mechanisms of Aging and Development 1997, V93, P171 CAPLUS
(5) Gorkovenko, A; Can J Microbiol 1997, V43, P384 CAPLUS
(7) Gorkovenko, A; Proc Am Chem Soc, Div Polym Sci Eng 1995, V72, P92 CAPLUS
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 2 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 2000:628019 CAPLUS
DOCUMENT NUMBER: 133:213051
TITLE: Acinetobacter **calcoaceticus** **RAG-1** **emulsan** and **emulsan** analogs immunization formulations and use
INVENTOR(S): Kaplan, David L.; Fuhrman, Juliet; Gross, Richard A.
PATENT ASSIGNEE(S): Trustees of Tufts College, USA; University of Massachusetts Lowell
SOURCE: PCT Int. Appl., 59 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000051635	A2	20000908	WO 2000-US5805	20000303
WO 2000051635	A3	20010111		

W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: US 1999-123056 P 19990305
AB Immunization formulations comprising an **antigen** and an **emulsan** or **emulsan** analog are formed and can be administered to a host. The **emulsan** or **emulsan** analog is an adjuvant in the immunization formulation. The **emulsan** or **emulsan** analog is secreted from Acinetobacter **calcoaceticus**. In particular, the **emulsan** or **emulsan** analog is secreted from

Acinetobacter **calcoaceticus RAG-1**.
The **emulsan** analog is produced and secreted from Acinetobacter **calcoaceticus** cultured in the presence of varying fatty acid sources. The **emulsan** analog is also produced and secreted from mutants of Acinetobacter **calcoaceticus**, such as transposon mutants of Acinetobacter **calcoaceticus RAG-1**.

IT **25550-58-7D, Dinitrophenol**, hemocyanin conjugates
RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); THU (Therapeutic use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(Acinetobacter **calcoaceticus RAG-1**
emulsan and **emulsan** analogs immunization
formulations and use)

L3 ANSWER 3 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 2000:327757 CAPLUS
TITLE: Development of new therapeutics from microbial biosurfactants and biomolecules.
AUTHOR(S): Gross, Richard A.; Fuhrman, Juliet; Kaplan, David L.
CORPORATE SOURCE: Department of Chemistry, Chemical Engineering and Material Science, Polytechnic University, Brooklyn, NY, 11201, USA
SOURCE: Book of Abstracts, 219th ACS National Meeting, San Francisco, CA, March 26-30, 2000 (2000), CARB-080. American Chemical Society: Washington, D. C.
CODEN: 69CLAC
DOCUMENT TYPE: Conference; Meeting Abstract
LANGUAGE: English

AB Microbially-derived lipopolysaccharides are being explored for inflamatory responses with macrophages because of their analogous structure to **bacterial** endotoxins. A key benefit of the microbial liposaccharides known as **emulsans** from the **bacterium** Actinetobacter **calcoaceticus** Actinetobacter **calcoaceticus** is their ability to modulate biol. responses by the control of their structural features. Applications of **emulsans** as "tailorable" vaccine adjuvants will be reported using macrophage screening and in mouse studies. In a similar fashion, studies of natural glycolipids called sophorolipids will also be reported. These glycolipids are produced in high yields by yeast. We have developed methods to sep. the variuos fractions, produce pure compds. and carry out lipase-catalyzed site-selective modifications. Studies using these compds. as anti-cancer agents have thus far proved promising. Other biomedical applications of site-selectively-modified glycolipids are underway.

L3 ANSWER 4 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1999:248597 CAPLUS
DOCUMENT NUMBER: 130:351253
TITLE: Control of unsaturated fatty acid substituents in **emulsans**
AUTHOR(S): Gorkovenko, A.; Zhang, J.; Gross, R. A.; Kaplan, D. L.
CORPORATE SOURCE: Polymer Research Institute, Six Metrotech Center, Polytechnic University, Brooklyn, NY, 11201, USA
SOURCE: Carbohydr. Polym. (1999), 39(1), 79-84
CODEN: CAPOD8; ISSN: 0144-8617
PUBLISHER: Elsevier Science Ireland Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB The ability to regulate the content of unsatd. fatty acids (FAs) of **emulsans** (EMs) formed by Acinetobacter **calcoaceticus** **RAG-1** was studied. Studies of EM biosynthesis with 13C1-labeled FAs demonstrated that 95 .+-. 7% of 16:1(9-cis) incorporated into EMs (EM-FAs) were formed by desatn. of the carbon source 16:0. An aerobic desatn. mechanism involving .DELTA.-9 desaturase activity was proposed to explain these results. The direct incorporation of .DELTA.-9-cis unsatd. acids occurred concurrently with a decrease in the content of other 9-cis unsatd. EM-FAs. Important factors which ultimately detd. the compn. of unsatd. EM-FAs were the following: (i) feedback inhibition of .DELTA.-9 desaturase activity, (ii) direct incorporation of FAs from a carbon source and (iii) two-carbon unit elongation or removal. The incorporation of polyunsatd. FAs into EMs was also accomplished by the selective feeding method. For example, by feeding RAG-1 with 18:2(9,12-trans), an EM was formed that contained almost 55 nmol/mg-EM (GC-MS). The surface activities of the new EMs from unsatd. FAs were evaluated.
REFERENCE COUNT: 12
REFERENCE(S): (1) Belsky, I; FEBS Lett 1979, V101, P175 CAPLUS
(3) Gorkovenko, A; Can J Microbiol 1997, V43, P384 CAPLUS
(4) Gorkovenko, A; Polymeric Materials: Science and Engineering 1995, V72, P92 CAPLUS
(6) Gutnick, D; US 4311832 1982 CAPLUS
(7) Gutnick, D; Biosurfactants and Biotechnology 1987, P211 CAPLUS
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 5 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1998:567403 CAPLUS
DOCUMENT NUMBER: 129:229723

TITLE: Fuzzy control of ethanol concentration for **emulsan** production in a fed-batch cultivation of Acinetobacter **calcoaceticus RAG-1**
AUTHOR(S): Choi, Jeong-Woo; Oh, Seung-Mok; Choi, Hyun-Goo; Lee, Sang-Baek; Lee, Kwang-Soon; Lee, Won-Hong
CORPORATE SOURCE: Department of Chemical Engineering, Sogang University, Seoul, 100-611, S. Korea
SOURCE: Korean J. Chem. Eng. (1998), 15(3), 310-316
CODEN: KJCHE6; ISSN: 0256-1115
PUBLISHER: Korean Institute of Chemical Engineers
DOCUMENT TYPE: Journal
LANGUAGE: English

AB A fuzzy control system was organized and applied to the control of ethanol concn. in a fed-batch cultivation process for **emulsan** prodn. by Acinetobacter **calcoaceticus RAG-1**. The membership functions and fuzzy rules were detd. by sets of data and experiences obtained from the preliminary culture expts. The input variables, error (the difference between the set point value and the process variable) and the change of the error, were fuzzified by using the membership functions and the output variable, change of the ethanol feed rate, was inferred based on the membership functions and the given fuzzy rules. To obtain the numerical value for the output variable, the center-of-gravity method was used in the defuzzification procedure. The results showed that the ethanol concn. was well regulated around optimal level and the **emulsan** yield was increased compared with that of the cultivation controlled by the conventional feedback control loop.

L3 ANSWER 6 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1997:585087 CAPLUS
DOCUMENT NUMBER: 127:275243
TITLE: Biological modification of hydrophobic group in Acinetobacter **calcoaceticus RAG-1 emulsan**
AUTHOR(S): Kim, Sang-Yong; Oh, Deok-Kun; Kim, Jung-Hoe
CORPORATE SOURCE: R & D Center, Tong Yang Confectionery, Seoul, 140-715, S. Korea
SOURCE: J. Ferment. Bioeng. (1997), 84(2), 162-164
CODEN: JFBIEX; ISSN: 0922-338X
PUBLISHER: Society for Fermentation and Bioengineering, Japan
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The fatty acid group in Acinetobacter **calcoaceticus emulsan** was modified by using different carbon sources. The major components of fatty acid group were 3-hydroxydodecanoic acid

(3-HDDA), hexadecanoic acid, and octadecenoic acid. Among these, 3-HDDA was found to have the most important influence on the emulsifying activity of the **emulsan**.

L3 ANSWER 7 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1997:375386 CAPLUS
DOCUMENT NUMBER: 127:108019
TITLE: Relationship between emulsifying activity and carbohydrate backbone structure of **emulsan** from Acinetobacter **calcoaceticus** RGA-1
AUTHOR(S): Kim, Pil; Oh, Deok-Kun; Kim, Sang-Yong; Kim, Jung-Hoe
CORPORATE SOURCE: Dep. Biological Sci., Korea Advanced Inst. Sci. and Tech., Daejoen, 305-701, S. Korea
SOURCE: Biotechnol. Lett. (1997), 19(5), 457-459
CODEN: BILED3; ISSN: 0141-5492
PUBLISHER: Chapman and Hall
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Various **emulsan** samples with the different degrees of branching of the carbohydrate backbone were obtained from A. **calcoaceticus** under different culture conditions. The emulsifying activity of **emulsan** had a linear correlation to the branching degrees of the carbohydrate backbone (r2 = 0.930), suggesting that the structure of carbohydrate backbone was an important factor influencing emulsifying activity.

L3 ANSWER 8 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1997:312493 CAPLUS
DOCUMENT NUMBER: 126:290469
TITLE: Biosynthesis and characterization of **emulsan**-analogs (acinetobacter **calcoaceticus**, n-alkanoic acids, fluorinated fatty acids, ether linkage, hydroxy fatty acids)
AUTHOR(S): Zhang, Jinwen
CORPORATE SOURCE: Univ. of Lowell, Lowell, MA, USA
SOURCE: (1996) 125 pp. Avail.: Univ. Microfilms Int., Order No. DA9713787
From: Diss. Abstr. Int., B 1997, 57(11), 6968
DOCUMENT TYPE: Dissertation
LANGUAGE: English
AB Unavailable

L3 ANSWER 9 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1997:277426 CAPLUS
DOCUMENT NUMBER: 126:329553

TITLE: Incorporation of 2-hydroxyl fatty acids by Acinetobacter **calcoaceticus** **RAG-1** to tailor **emulsan** structure
AUTHOR(S): Zhang, Jinwen; Gorkovenko, Alexander; Gross, Richard A.; Allen, Alfred L.; Kaplan, David
CORPORATE SOURCE: Dep. Chem., Univ. Massachusetts Lowell, Lowell, MA, 01854, USA
SOURCE: Int. J. Biol. Macromol. (1997), 20(1), 9-21
CODEN: IJBMDR; ISSN: 0141-8130
PUBLISHER: Elsevier
DOCUMENT TYPE: Journal
LANGUAGE: English

AB A. **calcoaceticus** **RAG-1** was cultured on different chain length satd. 2-hydroxyl fatty acid (2-HOFA) C sources as follows: C12:0 (2-OH), C14:0 (2-OH), C16:0 (2-OH) and C18:0 (2-OH). These 2-HOFAs were used as either sole C sources or cosubstrates with C14:0 (total 1%) to form new **emulsans** (EMs) having controlled side chain FA structure and, therefore, unique emulsifier characteristics. EM yields and cell dry wts. ranged 0.6-1.8 g/L and 0.9-3.9 g/L, resp., depending on the C source(s) and the cultivation conditions. The content of C12:0 (2-OH) EM substituents reached high levels (306 nmol EM/mg, 64.4 mol% of total FAs) by selectively feeding this FA. Substantial quantities of 2-HOFAs with chain lengths .gtoreq.C14, .ltoreq.96 nmol EM/mg or 15.2 mol% for C16:0 (2-OH), were also incorporated in EMs by providing the corresponding 2-HOFA C source. By increasing the medium 2-HOFA concn. large increases in EM total FA contents resulted. The EM FA content was .ltoreq.955 nmol EM/mg or 23 wt% for a culture contg. 0.75 g/100 mL C18:0 (2-OH). An important metabolic pathway involved in EM side chain formation from C16:0 (2-OH) and C18:0 (2-OH) involves decarboxylation, oxidn. of the alkanol to the corresponding n-1 FA-CoA intermediate, and formation of odd chain length substituent side chain linkages by an EM acyl transferase. Addn. of the enzyme alkylating agent iodoacetamide to cultures was used to: (i) enhance the incorporation into EMs of both C12:0 (2-OH) and C16:0 (2-OH) substituents and (ii) increase by 1.3-1.8-fold the total EM FA content. Enhanced emulsification activity of EMs is not necessarily achieved by forming products with relatively high 2- and 3-hydroxydodecanoic acid contents.

L3 ANSWER 10 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1997:268319 CAPLUS
DOCUMENT NUMBER: 126:342490
TITLE: Bioengineering of emulsifier structure: **emulsan** analogs
AUTHOR(S): Gorkovenko, Alexander; Zhang, Jinwen; Gross, Richard A.; Allen, Alfred L.; Kaplan, David L.

CORPORATE SOURCE: Dept. of Chemistry, Univ. of Massachusetts Lowell, Lowell, MA, 01854, USA
SOURCE: Can. J. Microbiol. (1997), 43(4), 384-390
CODEN: CJMIAZ; ISSN: 0008-4166
PUBLISHER: National Research Council of Canada
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Strategies were investigated to modulate the side chain structure of **emulsans** formed by Acinetobacter **calcoaceticus** **RAG-1**. Anal. of **emulsan** fatty acid side chain groups by gas chromatog.-mass spectrometry (GC-MS) revealed that by providing the exogenous n-alkanoic fatty acids 15:0, 16:0, and 17:0, **emulsan** analogs were formed with 53, 46, and 44 mol%, resp., of fatty acid substituents with chain lengths equal to that of the C source. In contrast, the increase in **emulsan** fatty acids of chain lengths <15 or >17 by providing corresponding shorter and longer chain length fatty acids as C sources was not substantial. When [1-13C]-labeled (99% enriched) palmitic acid was used as a C source along with acetate, anal. of m/z 75/74 and 87/88 isotopomer ratios by GC-MS indicated that 84 and 86% of the 16:0 and 16:1 (9-cis) side groups, resp., were incorporated intact from the 16:0 C source. The percentage of 14-, 15-, 16-, 17-, and 18-C chain length fatty acid esters that were monounsatd. were 11, 26, 50, 70, and 85%, resp. Based on the obsd. percentage of unsatd. chain length dependence and almost identical enrichment at C-1 of 16:0 and 16:1(9-cis) side groups from [1-13C]-labeled expts., it was concluded that desatn. of preformed n-alkanoic acids was the predominant mechanism of their formation. Further work established correlations between side chain structure and product emulsification specificity/activity, so that bioengineered **emulsans** with improved selectivity can now be formed.

L3 ANSWER 11 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1993:490809 CAPLUS
DOCUMENT NUMBER: 119:90809
TITLE: Hydrophobically modified **proteins**
INVENTOR(S): Nestaas, Eirik; Hrebenar, Kevin R.; Lewis, Jerome M.; Whitesides, George M.
PATENT ASSIGNEE(S): Emulsan Biotechnologies, Inc., USA
SOURCE: U.S., 53 pp. Cont. of U.S. Ser. No. 224,443, abandoned.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

US 5212235	A	19930518	US 1990-634369	19901227
PRIORITY APPLN. INFO.:			US 1987-22443	19870303

AB C12-30 alkyl- or alkenylsuccinylated **proteins**, in which the succinyl group is attached to the **protein** by an amide linkage, are emulsifiers and emulsion stabilizers useful in many consumer and industrial applications. Thus, casein, bovine serum albumin, fish meal **protein**, or an Acinetobacter **calcoaceticus** fermn. broth contg. **emulsan**, derivatized with dodecenylsuccinic anhydride, each improved the cream stability of a hexadecane emulsion in aq. buffer.

L3 ANSWER 12 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1991:423905 CAPLUS
DOCUMENT NUMBER: 115:23905
TITLE: Toxicity testing of synthetic and biogenic surfactants on marine microorganisms
AUTHOR(S): Poremba, K.; Gunkel, W.; Lang, S.; Wagner, F.
CORPORATE SOURCE: Dep. Mar. Microbiol., Biol. Anstalt Helgoland, Helgoland, D-2192, Fed. Rep. Ger.
SOURCE: Environ. Toxicol. Water Qual. (1991), 6(2), 157-63
CODEN: ETWQEZ; ISSN: 1053-4725
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The toxicity of four synthetic surfactants, two com. oil dispersants, and six biosurfactants were examinated. The test systems were (a) **bacterial** growth inhibition, (b) microalgae growth inhibition, (c) microflagellate growth inhibition, (d) biodegrdn., and (e) bioluminescence inhibition (Microtox test). The multiplication of **bacteria** was stimulated by surfactants, while that of microflagellates and microalgae was inhibited. This may be due to the metabolic usage of surfactants, esp. biosurfactants, by **bacteria**. The bioluminescence was very sensitive to surfactants. No toxicity could be detected with glucose-lipid, produced by the marine **bacterium** Alcaligenes species MM1. Most biosurfactants were degraded faster and possessed higher EC50 values than synthetic dispersants.

L3 ANSWER 13 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1990:457398 CAPLUS
DOCUMENT NUMBER: 113:57398
TITLE: Production of exopolysaccharides by Acinetobacter strains in a controlled fed-batch fermentation process using soap stock oil (SSO) as carbon source
AUTHOR(S): Shabtai, Yossef
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel-Aviv Univ.,

Tel-Aviv, 69978, Israel
SOURCE: Int. J. Biol. Macromol. (1990), 12(2), 145-52
CODEN: IJBMDR; ISSN: 0141-8130
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The prodn. of two extracellular capsular heteropolysaccharides by two different Acinetobacter strains has been studied in sep. controlled fermn. processes with a view to their industrial applications as specific dispersing agents. The first, **emulsan**, is an extracellular polyanionic amphipathic heteropolysaccharide (MW 106 D) made by A. **calcoaceticus RAG-1**. It forms and stabilizes oil in water emulsions. The other, biodispersan (PS-A2), is another extracellular zwitterionic heteropolysaccharide (MW 51 kD) made by A. **calcoaceticus** A2. This polysaccharide disperses big solid limestone granules forming .mu.m-size water suspension. Both polysaccharides are synthesized within the cells, exported to their outer surface to form an extracellular cell-assocd. capsule and released subsequently into the growth medium. The polymers were produced in a computer-controlled fed-batch intensively aerated fermn. process. A com. available and cheap fatty acids mixt. (soap stock oil) served as the carbon source, and was fed in coordination with the required nitrogen. The coordinated feed of carbon and nitrogen was operated on the basis of two metabolic correlations: the first correlation related the cell **protein** produced and the ammonium nitrogen consumed with the outcoming coeffs. of 24 and 21 mm NH3/g **protein** for the **emulsan** and the biodispersan fermns. resp. The second correlation linked the consumption of the fatty acids with that of the nitrogen source dictating the appropriate C/N ratio of the feed into the operating fermentor. These ratios were 7.7 g C/g N for the **emulsan** fermn. and 8.5 g C/g N in the case of the biodispersan prodn. process. The polysaccharides were produced sep. under a growth assocd. pattern in a short fermn. process (40-50 h) at a rate of 0.7 g **emulsan**/L-h. During the fermns. the polysaccharides accumulated to about 25 g/L and 12 g/L of emulsion and the biodispersan, resp. The corresponding yields were about 0.3 g **emulsan**/g FA and 0.2 g biodispersan/g FA. The rate of oxygen uptake (OUR) by the cells was the major factor affecting the specific rate of polymers prodn. A max. **emulsan** specific productivity of .apprx.0.08 g **emulsan**/g cell-h was found at a specific OUR of .apprx.10 mM O2/g cell-h. A direct relationship was obsd. between the biodispersan specific productivity and the specific O2 uptake of the relevant producing cell. Enhancing oxygen transfer rate by elevation of oxygen driving force enabled maintenance of high level of specific OUR of .apprx.12 mM O2/g cell-h, elevating the biodispersan productivity to .apprx.0.5 g biodispersan/L-h.

L3 ANSWER 14 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1989:613320 CAPLUS
DOCUMENT NUMBER: 111:213320
TITLE: Adherence of **emulsan**-producing Acinetobacter **calcoaceticus** to hydrophobic liquids
AUTHOR(S): Ng, T. K.; Hu, W. S.
CORPORATE SOURCE: Dep. Chem. Eng. Mater. Sci., Univ. Minnesota, Minneapolis, MN, 55455, USA
SOURCE: Appl. Microbiol. Biotechnol. (1989), 31(5-6), 480-5
CODEN: AMBIDG; ISSN: 0175-7598
DOCUMENT TYPE: Journal
LANGUAGE: English
AB The adherence of A. **calcoaceticus** ATCC 31012 cells to hexadecane and perfluorocarbon FC-43 was measured using the **Bacterial** Adherence To Hydrocarbon (BATH) assay. In batch culture the adherence of cells to both hydrophobic liqs. increased sharply during the exponential growth phase and remained high for the remainder of the culture period. No correlation was found between the surface **emulsan** concn. and the adherence to perfluorocarbon FC-43 and hexadecane. In continuous cultures, the prodn. of cell-free **emulsan** was growth-assocd. The adherence to both hydrophobic liqs. decreased with increasing diln. rate while the amt. of surface **emulsan** increased. Furthermore, exogenously added **emulsan** decreased the adherence to hydrophobic liqs. Thus, the accumulation of surface **emulsan** does not appear to have a beneficial effect for cell adherence to hydrophobic liqs.

L3 ANSWER 15 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1989:6314 CAPLUS
DOCUMENT NUMBER: 110:6314
TITLE: Intelligent sensors in biotechnology. Applications for the monitoring of fermentations and cellular metabolism
AUTHOR(S): Vallino, Joseph J.; Stephanopoulos, Gregory N.
CORPORATE SOURCE: Dep. Chem. Eng., Massachusetts Inst. Technol., Cambridge, MA, 02139, USA
SOURCE: Ann. N. Y. Acad. Sci. (1987), 506(Biochem. Eng. 5), 415-30
CODEN: ANYAA9; ISSN: 0077-8923
DOCUMENT TYPE: Journal
LANGUAGE: English
AB An algorithm was developed to show how the concns. of substrate, product, biomass, and O2 in the gas and liq. phases, as well as the yields, specific growth rate, and the O2 mass-transfer coeff. could

be estd. from the online measurements of O2 and CO2 in the off-gas and the dissolved O2 concn. The robustness and accuracy of the algorithm was demonstrated with an **emulsan**-producing fermn. of Acinetobacter **calcoaceticus**. An algorithm was also developed for detg. the distribution of C among primary metabolic pathways. Since this algorithm was not completely developed, no quant. results were available.

L3 ANSWER 16 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1988:183365 CAPLUS
DOCUMENT NUMBER: 108:183365
TITLE: Unmasking of surface components by removal of cell-associated **emulsan** from Acinetobacter sp. RAG-1
AUTHOR(S): Pines, Ophry; Shoham, Yuval; Rosenberg, Eugene; Gutnick, David
CORPORATE SOURCE: Hadassah Med. Sch., Hebrew Univ., Jerusalem, Israel
SOURCE: Appl. Microbiol. Biotechnol. (1988), 28(1), 93-9
CODEN: AMBIDG; ISSN: 0175-7598
DOCUMENT TYPE: Journal
LANGUAGE: English
AB A. **calcoaceticus RAG-1** cells lacking the **emulsan** capsule on the cell surface were obtained by selecting, with a specific phage, for mutants that lack **emulsan** and by removal of the **emulsan** capsule from wild-type cells with a specific **emulsan** depolymerase. **Emulsan**-deficient cells obtained by either method become deficient in the adsorption of phage ap3 and sensitive to a newly isolated bacteriophage, n.vphi.. When RAG-1 cells were 1st treated with **emulsan** depolymerase and subsequently incubated without the enzyme, regeneration of the cell-assocd. **emulsan** was correlated with an increase in phage ap3 adsorption and an inhibition in phage n.vphi. adsorption. By partial regeneration of cell surface **emulsan**, a physiol. state was obtained in which RAG-1 cells were sensitive to and efficiently adsorbed both phages. Enzyme-treated RAG-1 cells were more adherent to hexadecane than the untreated RAG-1 cells. The data indicate that in addn. to its function as the ap3 receptor, cell-assocd. **emulsan** masks the expression of other cell-surface determinant(s) which function(s) as receptor for bacteriophage n.vphi., and cell-surface sites which enhance adherence to hydrophobic surfaces.

L3 ANSWER 17 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1988:52474 CAPLUS
DOCUMENT NUMBER: 108:52474
TITLE: Microbial surfactants: evaluation, types, production and future applications

AUTHOR(S): Desai, Jitendra
CORPORATE SOURCE: Res. Cent., Indian Petrochem. Corp. Ltd., Baroda, 391 346, India
SOURCE: J. Sci. Ind. Res. (1987), 46(10), 440-9
CODEN: JSIRAC; ISSN: 0022-4456
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English

AB A review with 130 refs. Recent years have witnessed a growing interest in the surface-active mols. of microbial origin because of their potential applications in enhanced oil recovery, cleaning-up of natural sites contaminated with petroleum, and transportation of heavy crude oil. Most common microbial surfactants are glycolipids in which trehalose, sophorose or rhamnose is attached to a lipid moiety. Complex biosurfactants such as cyclic lipopeptide (surfactin) produced by Bacillus subtilis and heteropolysaccharide **protein** complex (**emulsan**) produced by Acinetobacter **calcoaceticus** have also been isolated and studied. Microbial surfactants are more effective and versatile than many synthetic surfactants owing to their selective action, biodegradable nature, and stability at higher temps. and salt concns. The future of microbial surfactants will be governed by the overall economic gain between their prodn. and application.

L3 ANSWER 18 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1987:116217 CAPLUS
DOCUMENT NUMBER: 106:116217
TITLE: Reconstitution of emulsifying activity of Acinetobacter **calcoaceticus** BD4 **emulsan** by using pure polysaccharide and **protein**
AUTHOR(S): Kaplan, Nachum; Zosim, Zinaida; Rosenberg, Eugene
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE: Appl. Environ. Microbiol. (1987), 53(2), 440-6
CODEN: AEMIDF; ISSN: 0099-2240
DOCUMENT TYPE: Journal
LANGUAGE: English

AB A. **calcoaceticus** BD4 and BD413 produce extracellular emulsifying agents when grown on 2% ethanol medium. For emulsifying activity, both polysaccharide and **protein** fractions were required, as demonstrated by selective digestion of the polysaccharide with a specific bacteriophage-borne polysaccharide depolymerase, deproteinization of the extracellular emulsifying complex with hot phenol, and reconstitution of emulsifier activity with pure polysaccharide and a polysaccharide-free **protein** fraction. Chem. modification of the carboxyl groups in the polysaccharide resulted in a loss of activity. The **protein**

required for reconstitution of emulsifying activity was purified sevenfold. The BD4 **emulsan** apparently derives its amphipathic properties from the assocn. of an anionic hydrophilic polysaccharide with **proteins**.

L3 ANSWER 19 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1985:456621 CAPLUS
DOCUMENT NUMBER: 103:56621
TITLE: Bioemulsifier-stabilized hydrocarbosols
INVENTOR(S): Hayes, Michael Edward; Hrebenar, Kevin Robert; Murphy, Patricia Lord; Futch, Laurence Ernest, Jr.; Deal, James Frances, III; Bolden, Paul Lester, Jr.
PATENT ASSIGNEE(S): Petroleum Fermentations, Inc., USA
SOURCE: PCT Int. Appl., 128 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 4
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 8501889	A1	19850509	WO 1984-US1669	19841015
W: AU, BR, DK, FI, JP, NO				
US 4618348	A	19861021	US 1983-547892	19831102
US 4684372	A	19870804	US 1984-653808	19840924
AU 8435565	A1	19850522	AU 1984-35565	19841015
AU 574403	B2	19880707		
BR 8407156	A	19851008	BR 1984-7156	19841015
JP 61501754	T2	19860821	JP 1984-504013	19841015
JP 2543495	B2	19961016		
EP 144257	A2	19850612	EP 1984-402168	19841029
EP 144257	A3	19860219		
EP 144257	B1	19920826		
R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE				
AT 79787	E	19920915	AT 1984-402168	19841029
ZA 8408499	A	19850626	ZA 1984-8499	19841031
ES 537272	A1	19860316	ES 1984-537272	19841031
ES 542876	A1	19851216	ES 1985-542876	19850507
DK 8502983	A	19850701	DK 1985-2983	19850701
DK 171344	B1	19960916		
NO 8502637	A	19850701	NO 1985-2637	19850701
NO 174494	B	19940207		
NO 174494	C	19940518		
FI 8502614	A	19850702	FI 1985-2614	19850702
US 4618348	B1	19900501	US 1988-90001581	19880823
US 4684372	B1	19900501	US 1988-90001583	19880823

US 4943390	A	19900724	US 1988-251071	19880928
WO 9104310	A1	19910404	WO 1989-US4121	19890920
W: JP				
RW: AT, BE, CH, DE, FR, GB, IT, LU, NL, SE				
EP 494860	A1	19920722	EP 1990-905073	19890920
EP 494860	B1	19951227		
R: AT, BE, CH, DE, FR, GB, IT, LI, LU, NL, SE				
JP 05501889	T2	19930408	JP 1990-506401	19890920
JP 2892115	B2	19990517		
AT 132179	E	19960115	AT 1990-905073	19890920
JP 05230479	A2	19930907	JP 1992-39778	19920226
JP 2644411	B2	19970825		
US 36983	E	20001212	US 1995-447922	19950523

PRIORITY APPLN. INFO.:

US 1983-547892	A	19831102
US 1984-653808	A	19840924
WO 1984-US1669	A	19841015
EP 1984-402168	A	19841029
US 1985-780774	B1	19850927
US 1985-780783	A5	19850927
WO 1989-US4121	W	19890920
US 1990-633990	B1	19901226
US 1992-911255	B2	19920707

AB Oil-in-water fuel emulsions contg. <90 wt.% heavy crudes and distn. residues (API <20.degree. and viscosity >100 cP at 150.degree.F) for pumping, pipeline transport, and direct combustion are manufd. by addn. of 50-10,000 ppm microbiol. surfactants .alpha.-**emulsans**, which are capsular-extracellular microbiol. **protein**-assocd. lipoheteropolysaccharides produced by Acinetobacter **calcoaceticus** ATCC 31012 and its derivs.). Thus, Boscan crude oil (sp. gr. 0.983, API 12.5.degree.) was emulsified with 27 vol.% water and a surfactant package contg. .alpha.-**emulsan** 15%, Tergitol NP40 [9016-45-9] 42.5%, and Alfonic 1412A [75535-26-1] 42.5% at a 250:1 (wt.) oil-surfactant ratio. The viscosity was reduced from 24,000 to 140 cP at 100%.

L3 ANSWER 20 OF 28 CAPLUS COPYRIGHT 2001 ACS

ACCESSION NUMBER:	1984:99727 CAPLUS
DOCUMENT NUMBER:	100:99727
TITLE:	Specific binding of a bacteriophage at a hydrocarbon-water interface
AUTHOR(S):	Pines, Ophry; Gutnick, David
CORPORATE SOURCE:	George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE:	J. Bacteriol. (1984), 157(1), 179-83 CODEN: JOBAAY; ISSN: 0021-9193
DOCUMENT TYPE:	Journal
LANGUAGE:	English

AB **Emulsan**, the extracellular polyanionic emulsifying agent

produced by Acinetobacter **calcoaceticus RAG-1**, has been implicated as a receptor for a specific virulent **RAG-1** phage, ap3. Aq. solns. of **emulsan** did not interfere with phage ap3 adsorption to RAG-1 cells. However, binding of phage ap3 occurred at the interfaces of hexadecane-in-water emulsions specifically stabilized by **emulsan** polymers. Binding of ap3 to emulsions was inhibited either in the presence of anti-**emulsan** antibodies or in the presence of a specific **emulsan** depolymerase. When the phage was 1st bound to **emulsan**-stabilized emulsions and the emulsions subsequently treated with **emulsan** depolymerase, viable phage was released, indicating that phage ap3 DNA ejection was not triggered by binding. Apparently, **emulsan** functions as the ap3 receptor; to function as a receptor, **emulsan** assumes a specific conformation conferred on it by its specific interaction with hydrophobic surfaces.

L3 ANSWER 21 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1983:609502 CAPLUS
DOCUMENT NUMBER: 99:209502
TITLE: **Bacterial** adherence to hydrocarbons
AUTHOR(S): Rosenberg, M.; Gutnick, D. L.; Rosenberg, E.
CORPORATE SOURCE: Tel Aviv Univ., Tel Aviv, Israel
SOURCE: Microb. Enhanced Oil Recovery (1983), 114-23. Editor(s): Zajic, James E.; Cooper, David G.; Jack, Thomas R. PennWell Publ. Co.: Tulsa, Okla.
CODEN: 50LKAG
DOCUMENT TYPE: Conference
LANGUAGE: English
AB A simple, quant. assay method was used to measure the adherence of a variety of **bacteria** to liq. hydrocarbons. **Bacterial** species differed greatly in their ability to adhere to hydrocarbons; even within the same species, Acinetobacter **calcoaceticus**, different strains varied greatly in their cell surface hydrophobicity. No direct correlation was found between adherence to hydrocarbons and the ability to metabolize hydrocarbons. The high affinity of A. **calcoaceticus RAG-1** towards liq. hydrocarbons enabled the isolation of a spontaneous, nonadherent mutant, MR-481. Strain MR-481 exhibited no significant affinity toward the 3 test hydrocarbons, yet resembled the wild type in many properties, including prodn. of the extracellular emulsifying agent, **emulsan**. RAG-1 and MR-481 were compared for growth on hexadecane under conditions of limited agitation and at low inital cell d. Adherent RAG-1 cells were able to grow rapidly under these conditions, whereas nonadherent MR-481 cells failed to grow for

.gtoreq.54 h. However, addn. of **emulsan**, either initially or at various times after inoculation, enabled the nonadherent MR-481 cells to grow on hexadecane. Growth was not the result of reversion of MR-481 from nonadherent to adherent cells. Thus, adherence is a crucial factor in the growth of A. **calcoaceticus RAG-1** on hexadecane in the absence of extracellular emulsification of the substrate.

L3 ANSWER 22 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1983:608556 CAPLUS
DOCUMENT NUMBER: 99:208556
TITLE: Enzymic depolymerization of **emulsan**
AUTHOR(S): Shoham, Yuval; Rosenberg, Eugene
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE: J. Bacteriol. (1983), 156(1), 161-7
CODEN: JOBAAY; ISSN: 0021-9193
DOCUMENT TYPE: Journal
LANGUAGE: English

AB **Emulsan**, the polyanionic emulsifying agent synthesized by Acinetobacter **calcoaceticus RAG-1**, was depolymd. by an enzyme obtained from a soil **bacterium** YUV-1. The extracellular **emulsan** depolymerase was produced when strains RAG-1 and YUV-1 were grown together on agar medium. The enzyme was extd. from the agar and concd. by ultrafiltration and (NH4)2SO4 pptn. The mol. wt. of the enzyme was estd. to be 89,000. **Emulsan** depolymerase activity was due to an eliminase reaction which split glycosidic linkages within the heteropolysaccharide backbone of **emulsan** to generate reducing groups and .alpha.,.beta.-unsatd. uronides with an absorbance max. of 233 nm. Deesterified **emulsan** was degraded by **emulsan** depolymerase at only 27% of the rate of the native polymer. The treatment of **emulsan** solns. with **emulsan** depolymerase for brief periods caused a rapid and parallel drop in viscosity and emulsifying activity. More than 75% of the viscosity and emulsifying activity was lost at a time when <0.5% of the glycosidic linkages were broken. Apparently, **emulsan** depolymerase is an endoglycosidase and the higher the mol. wt. of **emulsan**, the greater its emulsifying activity. Exhaustive digestion of **emulsan** with **emulsan** depolymerase produced oligosaccharides with an no. av. mol. wt. of .apprx.3000. The fractionation of the digest on Bio-Gel P-6 yielded 4 broad peaks. The pooled fractions from each of the peaks contained the same relative amts. of reducing sugar and had an absorbance at 233 nm. The molar ratio of esterified sugar to reducing groups was .apprx.2 in each fraction.

L3 ANSWER 23 OF 28 CAPLUS COPYRIGHT 2001 ACS

ACCESSION NUMBER: 1983:591314 CAPLUS
DOCUMENT NUMBER: 99:191314
TITLE: Adherence of **bacteria** to hydrocarbons
AUTHOR(S): Rosenberg, E.; Rosenberg, M.; Gutnick, D. L.
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE: Proc. Int. Conf. Microb. Enhancement Oil Recovery (1983), Meeting Date 1982, Issue CONF-8205140, 20-8. Editor(s): Donaldson, Erle C.; Clark, J. Bennett. NTIS: Springfield, Va. CODEN: 50KPAQ
DOCUMENT TYPE: Conference
LANGUAGE: English

AB Acinetobacter **calcoaceticus RAG-1** cells adhere avidly to test hydrocarbons (xylene, octane, hexadecane, and crude oil) and also produce a potent polyanionic emulsifier referred to as **emulsan**. Mutants of A. **calcoaceticus RAG-1** deficient in **emulsan** synthesis are still able to adhere to hydrocarbons and grow on hexadecane or crude oil as the sole source of carbon and energy. However, mutants of A. **calcoaceticus RAG -1** unable to adhere to hydrocarbons failed to grow on hydrocarbon substrates. Adherence is a prerequisite for growth on hexadecane under 2 conditions: low initial cell d. and limited emulsification of the substrate. Such conditions prevail in most natural environments. On the other hand, bioemulsification is a cell d.-dependent phenomenon. Relatively high cell d. is required to produce enough extracellular emulsifying agent to markedly affect the hydrocarbon substrate. Adherence of microorganisms to hydrocarbons is neither an exclusive property of hydrocarbon-degrading microorganisms nor restricted to those hydrocarbons that the microorganism can metabolize. For example, Staphylococcus aureus, Serratia marcescens, and Streptococcus pyogenes adhered avidly to test hydrocarbons as a result of their high cell surface hydrophobicity, but were unable to metabolize any of the hydrocarbon substrates tested. A. **calcoaceticus RAG-1** can grow on alkanes but not arom compds.; however, it adhered equally well to both substances. Further, certain **bacteria** that have the genetic potential to degrade hydrocarbons, e.g., Pseudomonas aeruginosa, adhere poorly to hydrocarbons. It follows that introduction of hydrocarbon-degrading plasmids into microorganisms with low cell surface hydrophobicity may not lead to cells that interact well with hydrocarbons in open systems.

L3 ANSWER 24 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1983:402793 CAPLUS
DOCUMENT NUMBER: 99:2793

TITLE: Localization of **emulsan**-like polymers associated with the cell surface of Acinetobacter **calcoaceticus**

AUTHOR(S): Pines, Ophry; Bayer, Edward A.; Gutnick, David L.

CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel

SOURCE: J. Bacteriol. (1983), 154(2), 893-905
CODEN: JOBAAY; ISSN: 0021-9193

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Various immunochem. techniques were employed to probe the relation between the extracellular emulsifying agent (**emulsan**) and the cell-assocd. form of the polymer in A. **calcoaceticus** **RAG-1**. With an **emulsan**-specific antibody prepn., immunocytochem. labeling revealed that an **emulsan**-like **antigen** is a major component of the 125-nm minicapsule which envelopes the exponential-phase cell of the parent strain. The marked redn. of this capsule in stationary-phase cells was correlated with the prodn. of extracellular emulsifying activity. Crossed immunoelectrophoresis techniques demonstrated that the major antigenic component (S1) of the culture supernatant fluid is immunochem. identical to purified **emulsan**, yet electrophoretically distinct. The characteristics of the parent strain were compared with those of 2 phage-resistant mutant strains which are defective in extracellular **emulsan** prodn. One of these mutants, termed TR3, lacked both the **emulsan**-like capsule on the cell surface and the extracellular S1 component. A 2nd phage-resistant **emulsan**-defective mutant (TL4) was characterized by an antigenically altered and inactive form of extracellular **emulsan**. A relatively small amt. of **emulsan**-like capsular material was consistently demonstrated on the cell surface of this mutant. The correlation between phage sensitivity and extracellular **emulsan** prodn. was strengthened by the fact that **emulsan**-specific antibodies inhibited both emulsification activity and phage adsorption onto cells of the parent strain.

L3 ANSWER 25 OF 28 CAPLUS COPYRIGHT 2001 ACS

ACCESSION NUMBER: 1983:141447 CAPLUS

DOCUMENT NUMBER: 98:141447

TITLE: Inhibition of **bacterial** adherence to hydrocarbons and epithelial cells by **emulsan**

AUTHOR(S): Rosenberg, Eugene; Gottlieb, Anita; Rosenberg, Mel

CORPORATE SOURCE: Dep. Microbiol., George S. Wise Fac. Life Sci., Ramat Aviv, Israel

SOURCE: Infect. Immun. (1983), 39(3), 1024-8
CODEN: INFIBR; ISSN: 0019-9567
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Acinetobacter **calcoaceticus RAG-1** and BD413, as well as Streptococcus pyogenes M-5, adhered to octane. Adherence was inhibited by **emulsan** (I) (100 .mu.g/mL), the polymeric emulsifying agent produced by A. **calcoaceticus RAG-1**. I also inhibited adherence of S. pyogenes and RAG-1 to buccal epithelial cells. The mean values of bound S. pyogenes per epithelial cell were 57.2 and 20.7 for the control and I-contg. suspensions, resp.; mean values of bound RAG-1 per epithelial cell were 221 for the control and 40 for the suspension contg. 100 .mu.g of I/mL. Desorption of previously bound RAG-1 from epithelial cells by I was concn.-dependent: a max. of 80% desorption was obtained with 200 .mu.g of I/mL. The data showing that I desorbed 70% of the indigenous **bacterial** flora from buccal epithelial cells suggest that hydrophobic interactions mediate not only the in vitro adherence of lab. strains to epithelial cells, but actually govern the adherence of the majority of the **bacteria** that colonize this surface. The advantages of using I as an antiadherence agent include its chem. purity, stability, and polymeric nature.

L3 ANSWER 26 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1982:595575 CAPLUS
DOCUMENT NUMBER: 97:195575
TITLE: **Emulsan** production by Acinetobacter **calcoaceticus** in the presence of chloramphenicol
AUTHOR(S): Rubinovitz, C.; Gutnick, D. L.; Rosenberg, E.
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE: J. Bacteriol. (1982), 152(1), 126-32
CODEN: JOBAAY; ISSN: 0021-9193
DOCUMENT TYPE: Journal
LANGUAGE: English

AB When exponentially growing cultures of A. **calcoaceticus RAG-1** or RAG-92 were either treated with inhibitors of **protein** synthesis or starved for a required amino acid, there was a stimulation in the prodn. of **emulsan**, an extracellular polyanionic emulsifier. **Emulsan** synthesis in the presence of chloramphenicol was dependent on utilizable sources of C and N and was inhibited by CN-, N3-, or anaerobic conditions. Radioactive tracer expts. indicated that the enhanced prodn. of **emulsan** after the addn. of chloramphenicol was due to both the release of material synthesized before the addn. of the antibiotic (40%) and de novo synthesis of

the polymer (60%). Chem. anal. of RAG-1 cells demonstrated large amts. of polymeric amino sugars; cell-assocd. **emulsan** comprised .apprx.15% of the dry wt. of growing cells. Possibly, a polymeric precursor of **emulsan** accumulates on the cell surface during the exponential growth phase; in the stationary phase or during inhibition of **protein** synthesis, the polymer is released as a potent emulsifier.

L3 ANSWER 27 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1982:468999 CAPLUS
DOCUMENT NUMBER: 97:68999
TITLE: **Emulsan** in Acinetobacter **calcoaceticus RAG-1**: distribution of cell-free and cell-associated cross-reacting material
AUTHOR(S): Goldman, S.; Shabtai, Y.; Rubinovitz, C.; Rosenberg, E.; Gutnick, D. L.
CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Ramat Aviv, Israel
SOURCE: Appl. Environ. Microbiol. (1982), 44(1), 165-70
CODEN: AEMIDF; ISSN: 0099-2240
DOCUMENT TYPE: Journal
LANGUAGE: English
AB **Emulsan** is an extracellular polymeric bioemulsifier produced by A. **calcoaceticus RAG-1**. Antibodies prepd. against purified **emulsan** inhibited the activity of the polymer in a std. emulsification test. These antibodies were used to develop a sensitive enzyme-linked immunosorbent assay to monitor changes in cell-free **emulsan** throughout the growth cycle. This assay was also used to detect **emulsan** assocd. with the cell surface and to monitor changes in the distribution of cell-free and cell-assocd. **emulsan** throughout the growth cycle. Cells in the early exponential phase exhibited relatively large amts. of cell-assocd. **emulsan**, which decreased rapidly between the midexponential and early stationary phases. This drop in cell-assocd. material was accompanied by a rise in the concn. of extracellular polymer. Moreover, in agreement with previous results, prodn. of cell-free **emulsan** was enhanced by chloramphenicol. The release of this material from the cell surface in the presence of chloramphenicol apparently involved the synthesis of cell-assocd. crossreacting material, since the relative amt. of such cell-bound polymer remained const. during the treatment with the drug.

L3 ANSWER 28 OF 28 CAPLUS COPYRIGHT 2001 ACS
ACCESSION NUMBER: 1982:48669 CAPLUS
DOCUMENT NUMBER: 96:48669
TITLE: Relationship between phage resistance and

emulsan production, interaction of phages with the cell-surface of Acinetobacter **calcoaceticus RAG-1**

AUTHOR(S): Pines, Ophry; Gutnick, David L.

CORPORATE SOURCE: George S. Wise Fac. Life Sci., Tel Aviv Univ., Tel Aviv, Israel

SOURCE: Arch. Microbiol. (1981), 130(2), 129-33
CODEN: AMICCW; ISSN: 0302-8933

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The hydrocarbon-degrading strain A. **calcoaceticus RAG-1** produces an extracellular emulsifying agent capable of forming stable oil-in-water emulsions. The bioemulsifier, termed **emulsan**, is a polyanionic heteropolysaccharide (mol. wt. 106) composed mainly of N-acyl-D-galactosamine and an N-acylhexosaminuronic acid. To probe the interaction of **emulsan** with the cell surface prior to its release into the growth medium, 2 new virulent phages for A. **calcoaceticus RAG-1** were isolated from sewage and the properties of phage-resistant mutants were studied. The 2 phages, ap-2 and ap-3, were differentiated on the basis of plaque morphol., electron microscopy, and buoyant d. Mutants of A. **calcoaceticus RAG-1** which were resistant to 1 of the 2 phages retained sensitivity to the other phage. Resistance to phage ap-3 was accompanied by a severe drop in **emulsan** prodn. Independently isolated derivs. of A. **calcoaceticus RAG-1** with a defect in **emulsan** prodn. also turned out to be resistant to phage ap-3. Antibodies prepd. against purified **emulsan** specifically inhibited phage ap-3 adsorption to the cell surface of the parental strain.

(FILE 'MEDLINE, BIOSIS, EMBASE, WPIDS, CONFSCI, SCISEARCH, JICST-EPLUS, JAPIO' ENTERED AT 11:48:30 ON 05 SEP 2001)

L4 78 S L3

L5 50 DUP REM L4 (28 DUPLICATES REMOVED)

L5 ANSWER 1 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)

ACCESSION NUMBER: 2001:567943 SCISEARCH

THE GENUINE ARTICLE: 450GA

TITLE: Analysis of the wee gene cluster responsible for the biosynthesis of the polymeric bioemulsifier from the oil-degrading strain Acinetobacter lwoffii RAG-1

AUTHOR: Nakar D; Gutnick D L (Reprint)

CORPORATE SOURCE: Tel Aviv Univ, Dept Mol Microbiol & Biotechnol, IL-69978 Ramat Aviv, Israel (Reprint)

COUNTRY OF AUTHOR: Israel

SOURCE: MICROBIOLOGY-SGM, (JUL 2001) Vol. 147, Part 7, pp.

Searcher : Shears 308-4994

1937-1946.
Publisher: SOC GENERAL MICROBIOLOGY, MARLBOROUGH HOUSE, BASINGSTOKE RD, SPENCERS WOODS, READING RG7 1AE, BERKS, ENGLAND.
ISSN: 1350-0872.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 52

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB A cluster (27 kbp) of genes responsible for the biosynthesis of the amphipathic, polysaccharide bioemulsifier **emulsan** from the oil degrading Acinetobacter Iwoffii RAG-1 was isolated and characterized. The complete sequence of this cluster, termed wee, consisted of 20 ORFs. One set of 17 ORFs was transcribed in one direction, while a second set of three ORFs, 607 bp upstream of the first, was transcribed in the opposite direction. Mutations in either of the two regions caused defects in **emulsan** production, yielding specific activities of 5-14% of parental emulsifying activity. Putative functions could be assigned to **proteins** involved in production of nucleotide amino sugar precursors, transglycosylation, transacetylation, polymerization and transport. However, no JUMPstart or ops sequences, normally found associated with some polysaccharide biosynthetic gene clusters, were identified. Evidence is presented suggesting that the bioemulsifier may be a member of the group 1 or group 4 polysaccharides.

L5 ANSWER 2 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 2001:217071 SCISEARCH
THE GENUINE ARTICLE: 407HM
TITLE: Emulsifying activities of purified alasan **proteins** from Acinetobacter radioresistens KA53
AUTHOR: Toren A; Navon-Venezia S; Ron E Z; Rosenberg E (Reprint)
CORPORATE SOURCE: Tel Aviv Univ, George S Wise Fac Life Sci, Dept Mol Microbiol & biotechnol, IL-69978 Ramat Aviv, Israel (Reprint)
COUNTRY OF AUTHOR: Israel
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (MAR 2001) Vol. 67, No. 3, pp. 1102-1106.
Publisher: AMER SOC MICROBIOLOGY, 1752 N ST NW, WASHINGTON, DC 20036-2904 USA.
ISSN: 0099-2240.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 27

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The bioemulsifier of Acinetobacter radioresistens KA53, referred

to as alasan, is a high-molecular-weight complex of polysaccharide and **protein**. The emulsifying activity of the purified polysaccharide (apo-alasan) is very low. Three of the alasan **proteins** were purified by preparative sodium dodecyl sulfate-polyacrylamide gel electrophoresis and had apparent molecular masses of 16, 31, and 35 kDe. Emulsification assays using the isolated alasan **proteins** demonstrated that the active components of the alasan complex are the **proteins**. The 45-kDa **protein** had the highest specific emulsifying activity, 11% higher than the intact alasan complex. The 16- and 31-kDa **proteins** gave relatively low emulsifying activities, but they were significantly higher than that apo-alasan. The addition of the purified 16- and 31-kDa **proteins** to the 45-kDa **protein** resulted in a 1.8-fold increase in the specific emulsifying activity and increased stability of the oil-in-mater emulsion, Fast-performance liquid chromatography analysis indicated that the 45-kDa **protein** forms a dimer in nondenaturing conditions and interacts with the 16- and 31-kDa **proteins** to form a high-molecular-mass complex. The 45-kDa **protein** and the three-**protein** complex had substrate specificities for emulsification and a range of pH activities similar to that of alasan. The fact that the purified **proteins** are active emulsifiers should simplify structure-function studies and advance our understanding of their biological roles.

L5 ANSWER 3 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 2001:667297 SCISEARCH
THE GENUINE ARTICLE: 462NJ
TITLE: Studies on bioemulsifier production by Acinetobacter strains isolated from healthy human skin
AUTHOR: Patil J R; Chopade B A (Reprint)
CORPORATE SOURCE: Univ Poona, Dept Microbiol, Pune 411007, Maharashtra, India (Reprint)
COUNTRY OF AUTHOR: India
SOURCE: JOURNAL OF APPLIED MICROBIOLOGY, (AUG 2001) Vol. 91, No. 2, pp. 290-298.
Publisher: BLACKWELL SCIENCE LTD, P O BOX 88, OSNEY MEAD, OXFORD OX2 0NE, OXON, ENGLAND.
ISSN: 1364-5072.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 38

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Aims: In recent years, interest has been growing in the search for novel bioemulsifiers. Many **bacterial** genera including Acinetobacter have been reported to produce bioemulsifiers. The present study aims to screen Acinetobacter isolates from healthy

human skin for bioemulsifier production.

Methods and Results: Acinetobacter junii SC14 produced maximum bioemulsifier in the presence of almond oil during stationary growth phase at 37 degreesC and pH 7.2. Partially purified, nondialysable bioemulsifier from SC14 was a proteoglycan. The **protein** and polysaccharide fractions resulted in 95.2% reconstitution of the emulsification activity. The role of esterase in the release of cell-bound emulsifier and the contribution of capsular polysaccharide to the emulsification activity were observed.

Conclusion: Acinetobacter strains from human skin exhibited better emulsification activity than that by burn wound or soil isolates, owing to the inherent differences in chemical microenvironment of their habitats.

Significance and Impact of the Study: Investigation of skin commensals, especially acinetobacters, would lead to the discovery of novel bioemulsifiers with interesting properties. Attempts of screening and strain improvement directed towards skin commensals will open up new avenues for strains producing bioemulsifier on a commercial scale.

L5 ANSWER 4 OF 50 WPIDS COPYRIGHT 2001 DERWENT INFORMATION LTD
ACCESSION NUMBER: 2000-587255 [55] WPIDS
DOC. NO. CPI: C2000-175087
TITLE: Immunization formulations useful for stimulating cytokines in hosts, comprise **antigens** and adjuvants, especially **emulsan** or its analog.
DERWENT CLASS: B04 C06 D16
INVENTOR(S): FUHRMAN, J; GROSS, R A; KAPLAN, D L
PATENT ASSIGNEE(S): (TUFT) TUFTS COLLEGE; (UYMA-N) UNIV MASSACHUSETTS LOWELL
COUNTRY COUNT: 90
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
WO 2000051635	A2	20000908	(200055)*	EN	59
AU 2000035135	A	20000921	(200065)		

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ TZ UG ZW
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE

WO 2000051635 A2	WO 2000-US5805	20000303
AU 2000035135 A	AU 2000-35135	20000303

FILING DETAILS:

PATENT NO	KIND	PATENT NO
AU 2000035135 A	Based on	WO 200051635

PRIORITY APPLN. INFO: US 1999-123056 19990305
AN 2000-587255 [55] WPIDS
AB WO 200051635 A UPAB: 20001102
NOVELTY - An immunization formulation comprising an **antigen** and an **emulsan** or **emulsan** analog, is new.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method for the preparation of an **emulsan** analog.

ACTIVITY - Immunostimulant.

Forty 6-8 week-old female BALB/c mice were randomly placed in eight groups of five mice and immunized. Pre-immune sera was obtained 3 days prior to primary immunization. An **antigen** (**dinitrophenol** coupled to **keyhole limpet** hemocyanin referred to as DNP-**KLH**) and adjuvant were mixed by repeated aspiration through an 18-gage needle. Each mouse was immunized intraperitoneally with a 200 mu l total volume of adjuvant and **antigen**. Mice were boosted after 28 days, and sera were taken every 3 days after boosting until day 21 post-boost, and then again at 6 weeks and 9 weeks. Total DNP-specific antibody titers was determined by ELISA (enzyme linked immunosorbant assay). Controls included injection of mice with **emulsan** alone in the absence of **antigen**. An examination of gross pathology was performed, and tissue sections from spleen, liver, lung, kidney, heart, injection site and draining lymph nodes were prepared and examined for signs of inflammation or necrosis. Results not given.

MECHANISM OF ACTION - Immune response modulator.

USE - **Emulsan** (or analog of **emulsan**) are used as adjuvants with **antigen** for stimulating cytokines in hosts by immunomodulation of the host (which is preferably a cell line or a mammal) (claimed).

ADVANTAGE - Unlike prior art adjuvants, the **emulsan** or its analog has a capacity to generate an immune response with minimal side effects and induces the production of specific antibody and T-cell response, resulting in release of cytokines. The adjuvant has improved shelf life and is more stable.

Dwg.0/12

L5 ANSWER 5 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 2000:827641 SCISEARCH

THE GENUINE ARTICLE: 368WF
TITLE: Engineering **bacterial** biopolymers for the biosorption of heavy metals; new products and novel formulations
AUTHOR: Gutnick D L (Reprint); Bach H
CORPORATE SOURCE: TEL AVIV UNIV, GEORGE S WISE FAC LIFE SCI, DEPT MOL MICROBIOL & BIOTECHNOL, IL-69978 TEL AVIV, ISRAEL (Reprint)
COUNTRY OF AUTHOR: ISRAEL
SOURCE: APPLIED MICROBIOLOGY AND BIOTECHNOLOGY, (OCT 2000) Vol. 54, No. 4, pp. 451-460.
Publisher: SPRINGER-VERLAG, 175 FIFTH AVE, NEW YORK, NY 10010.
ISSN: 0175-7598.
DOCUMENT TYPE: General Review; Journal
FILE SEGMENT: LIFE; AGRI
LANGUAGE: English
REFERENCE COUNT: 91

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Bioremediation of heavy metal pollution remains a major challenge in environmental biotechnology. One of the approaches considered for application involves biosorption either to biomass or to isolated biopolymers. Many **bacterial** polysaccharides have been shown to bind heavy metals with varying degrees of specificity and affinity. While various approaches have been adopted to generate polysaccharide variants altered in both structure and activity, metal biosorption has not been examined. Polymer engineering has included structural modification through the introduction of heterologous genes of the biosynthetic pathway into specific mutants, leading either to alterations in polysaccharide backbone or side chains, or to sugar modification. In addition, novel formulations can be designed which enlarge the family of available **bacterial** biopolymers for metal-binding and subsequent recovery. An example discussed here is the use of amphipathic bioemulsifiers such as **emulsan**, produced by the oil-degrading Acinetobacter lwoffii RAG-1, that forms stable, concentrated (70%), oil-in-water emulsions (emulsanosols). In this system metal ions bind primarily at the oil/water interface, enabling their recovery and concentration from relatively dilute solutions. In addition to the genetic modifications described above, a new approach to the generation of amphipathic bioemulsifying formulations is based on the interaction of native or recombinant esterase and its derivatives with **emulsan** and other water-soluble biopolymers. Cation-binding emulsions are generated from a variety of hydrophobic substrates. The features of these and other systems will be discussed, together with a brief consideration of possible applications.

L5 ANSWER 6 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 1
ACCESSION NUMBER: 2001:1896 BIOSIS
DOCUMENT NUMBER: PREV200100001896
TITLE: Biological modification of the fatty acid group in an **emulsan** by supplementing fatty acids under conditions inhibiting fatty acid biosynthesis.
AUTHOR(S): Kim, Pil; Oh, Deok-Kun; Lee, Jung-Kul; Kim, Sang-Yong; Kim, Jung-Hoe (1)
CORPORATE SOURCE: (1) Department of Biological Sciences, Korea Advanced Institute of Science and Technology, Taejon, 305-701 South Korea
SOURCE: Journal of Bioscience and Bioengineering, (September, 2000) Vol. 90, No. 3, pp. 308-312. print. ISSN: 1389-1723.
DOCUMENT TYPE: Article
LANGUAGE: English
SUMMARY LANGUAGE: English
AB When the concentration of the antibiotic cerulenin was increased up to 3.0 mg/l in medium containing ethanol as a carbon source, the specific growth rate of Acinetobacter **calcoaceticus** and the fatty acid content of the **emulsan** decreased from 0.179 h-1 and 13.9% to 0.015 h-1 and 3.4%, respectively. The emulsifying activity in medium containing cerulenin decreased with increasing cerulenin concentration. In the culture containing 3.0 mg/l cerulenin, fatty acid biosynthesis was inhibited. Various fatty acids were added to this inhibitory culture as a second carbon source to modify the fatty acid group in the **emulsan**. When an odd-numbered fatty acid was added, the resulting **emulsan** was found to have other odd-numbered fatty acids that were not present originally. Among the **emulsan** produced from even-numbered fatty acids, the **emulsan** produced from myristic acid (C14) contained the greatest amount of the same-numbered fatty acids. When the amount of supplemental myristic acid was increased, the myristic acid content in the **emulsan** increased, but its emulsifying activity decreased.

L5 ANSWER 7 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 1999:353863 SCISEARCH
THE GENUINE ARTICLE: 191RC
TITLE: Adhesion of Acinetobacter venetianus to diesel fuel droplets studied with in situ electrochemical and molecular probes
AUTHOR: Baldi F (Reprint); Ivosevic N; Minacci A; Pepi M; Fani R; Svetlicic V; Zutic V
CORPORATE SOURCE: CA FOSCARI UNIV, DEPT ENVIRONM SCI, LA CELESTIA VIA CASTELLO 2737-B, I-30122 VENICE, ITALY (Reprint); UNIV SIENA, DEPT ENVIRONM BIOL, I-53100 SIENA, ITALY; UNIV FLORENCE, DEPT ANIM BIOL & GENET LEO

PARDI, I-50125 FLORENCE, ITALY; RUDJER BOSKOVIC INST, CTR MARINE & ENVIRONM RES, ZAGREB 10000, CROATIA
COUNTRY OF AUTHOR: ITALY; CROATIA
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (MAY 1999) Vol. 65, No. 5, pp. 2041-2048.
Publisher: AMER SOC MICROBIOLOGY, 1325 MASSACHUSETTS AVENUE, NW, WASHINGTON, DC 20005-4171.
ISSN: 0099-2240.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE; AGRI
LANGUAGE: English
REFERENCE COUNT: 41
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The adhesion of a recently described species, Acinetobacter venetianus VE-C3 (F. Di Cello, M, Pepi, F, Baldi, and R, Fani, Res. Microbiol. 148:237-249, 1997), to diesel fuel (a mixture of C-12 to C-28 n-alkanes) and n-hexadecane was studied and compared to that of Acinetobacter sp, strain RAG-I, which is known to excrete the emulsifying lipopolysaccharide, **emulsan**, Oxygen consumption rates, biomass, cell hydrophobicity, electrophoretic mobility, and zeta potential were measured for the two strains. The dropping-mercury electrode (DME) was used as an in situ adhesion sensor. In seawater, RAG-1 was ;ydropphobic, with an electrophoretic mobility (mu) of -0.38 x 10(-8) m(2) V-1 s(-1) and zeta potential (zeta) of -4.9 mV,while VE-C3 was hydrophilic, with mu of -0.81 x 10(-8) m2 V-1 s(-1) and zeta of -10.5 mV,The microbial adhesion to hydrocarbon (MATH) test showed that RAG-1 was always hydrophobic whereas the hydrophilic VE-C3 strain became hydrophobic only after exposure to n-alkanes, Adhesion of VE-C3 cells to diesel fuel was partly due to the production of capsular polysaccharides (CPS), which were stained with the lectin concanavalin A (ConA) conjugated to fluorescein isothiocyanate and observed in situ by confocal microscopy, The **emulsan** from RAG-I, which was negative to ConA, was stained with Nile Red fluorochrome instead. Confocal microscope observations at different times showed that VE-C3 underwent two types of adhesion: (i) cell-to-cell interactions, preceding the cell adhesion to the n-alkane, and (ii) incorporation of nanodroplets of n-alkane into the hydrophilic CPS to form a more hydrophobic polysaccharide-n-alkane matrix surrounding the cell wall. The incorporation of n-alkanes as nanodroplets into the CPS of VE-C3 cells might ensure the partitioning of the bulk apolar phase between the aqueous medium and the outer cell membrane and thus sustain a continuous growth rate over a prolonged period.

L5 ANSWER 8 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 2
ACCESSION NUMBER: 1999:416529 BIOSIS
DOCUMENT NUMBER: PREV199900416529

TITLE: Surface properties of **emulsan**-analogs.
AUTHOR(S): Zhang, Jinwen; Lee, Soo-Hyoung; Gross, Richard A. (1); Kaplan, David
CORPORATE SOURCE: (1) Six Metrotech Center, Polytechnic University, Polymer Research Institute, Brooklyn, NY, 11201 USA
SOURCE: Journal of Chemical Technology and Biotechnology, (Aug., 1999) Vol. 74, No. 8, pp. 759-765. ISSN: 0268-2575.
DOCUMENT TYPE: Article
LANGUAGE: English
SUMMARY LANGUAGE: English

AB The colloidal properties of **emulsans** formed by incubations of Acinetobacter **calcoaceticus RAG-1** on different carbon sources were studied. The apparent critical micelle concentrations (CMC) of the **emulsans** tested ranged from 25 to 58mg/dm-1. Surface and interfacial tensions of the solutions showed little dependence on pH between 2 and 10. In contrast, increasing the pH from 2 to 6.5 resulted in a substantial increase in their ability to effectively emulsify aliphatic hydrocarbons. Hexadecane-in-water emulsions were prepared having droplet sizes between 6 and 19 mum. Many of the emulsions thus formed were found to be stable with respect to coalescence for several months. Certain structural features such as the total content of fatty acids and hydroxy fatty acids were found to have a significant effect on emulsifying activity. The maximum emulsifying activity occurred for **emulsans** containing about 460nmol of total fatty acid per mg of **emulsan** (nmolmg-1). Emulsifying activity also showed a maximum at about 170nmolmg-1-**emulsan** of 2- and 3- hydroxy dodecanoic acids. For substituents having chain lengths gtoreq15 carbonatoms, the emulsifying activity on hexadecane increased with their content up to 190nmolmg-1. On the other hand, for substituents having chain lengths of <15 carbonatoms, the emulsifying activity on hexadecane showed no obvious effect with their content up to 220nmolmg-1. A further increase in the shorter chain length fatty acids resulted in a decrease in emulsifying activity. Hence, a substrate-specific interaction between **emulsans** and the dispersed phase was observed.

L5 ANSWER 9 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1999:208391 BIOSIS
DOCUMENT NUMBER: PREV199900208391
TITLE: Control of unsaturated fatty acid substituents in **emulsans**.
AUTHOR(S): Gorkovenko, A.; Zhang, J.; Gross, R. A. (1); Kaplan, D. L.
CORPORATE SOURCE: (1) Polytechnic University, Polymer Research Institute, Six Metrotech Center, Brooklyn, NY, 11201 USA

SOURCE: Carbohydrate Polymers, (May, 1999) Vol. 39, No. 1, pp. 79-84.
ISSN: 0144-8617.
DOCUMENT TYPE: Article
LANGUAGE: English
SUMMARY LANGUAGE: English

AB The ability to regulate the content of unsaturated fatty acids (FAs) of **emulsans** (EMs) formed by Acinetobacter **calcoaceticus RAG-1** was studied. Studies of EM biosynthesis with 13C1-labeled FAs demonstrated that 95 +- 7% of 16:1(9-cis) incorporated into EMs (EM-FAs) were formed by desaturation of the carbon source 16:0. An aerobic desaturation mechanism involving DELTA-9 desaturase activity was proposed to explain these results. The direct incorporation of DELTA-9-cis unsaturated acids occured concurrently with a decrease in the content of other 9-cis unsaturated EM-FAs. Important factors which ultimately determined the composition of unsaturated EM-FAs were the following: (i) feedback inhibition of DELTA-9 desaturase activity, (ii) direct incorporation of FAs from a carbon source and (iii) two-carbon unit elongation or removal. The incorporation of polyunsaturated FAs into EMs was also accomplished by the selective feeding method. For example, by feeding **RAG-1** with 18:2(9,12-trans), an EM was formed that contained almost 55 nmol/mg-EM (GC-MS). The surface activities of the new EMs from unsaturated FAs were evaluated.

L5 ANSWER 10 OF 50 MEDLINE DUPLICATE 3

ACCESSION NUMBER: 1999195869 MEDLINE
DOCUMENT NUMBER: 99195869 PubMed ID: 10096135
TITLE: Oil-degrading Acinetobacter strain RAG-1 and strains described as 'Acinetobacter venetianus sp. nov.' belong to the same genomic species.
AUTHOR: Vaneechoutte M; Tjernberg I; Baldi F; Pepi M; Fani R; Sullivan E R; van der Toorn J; Dijkshoorn L
CORPORATE SOURCE: Department of Clinical Chemistry, Microbiology and Immunology, University Hospital, Ghent, Belgium. Mario.Vaneechoutte.rug.ac.be.
SOURCE: RESEARCH IN MICROBIOLOGY, (1999 Jan-Feb) 150 (1) 69-73.
Journal code: R6F; 8907468. ISSN: 0923-2508.
PUB. COUNTRY: France
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199905
ENTRY DATE: Entered STN: 19990607
Last Updated on STN: 19990607
Entered Medline: 19990525

AB Acinetobacter strain **RAG-1** (ATCC 31012) is an industrially important strain which has been extensively characterized with respect to its growth an hydrocarbons and its production of a high molecular mass bioemulsifier, **emulsan**. Although **RAG-1** has been investigated in detail for specific biochemical characteristics, its taxonomic status is uncertain and it is usually referred to as A. lwoffii or A. **calcoaceticus** sensu lato. However, results obtained by restriction analysis of the amplified rDNA and subsequently substantiated by DNA-DNA hybridization, partial 16S rDNA nucleotide sequence comparison and biochemical characterization indicate that **RAG-1** belongs to the genomic species recently described as 'A. venetianus'. Furthermore, these data confirm that 'A. venetianus' constitutes a new and distinct genomic species within the genus Acinetobacter.

L5 ANSWER 11 OF 50 JICST-EPlus COPYRIGHT 2001 JST
ACCESSION NUMBER: 980463597 JICST-EPlus
TITLE: Effects of Hydrodynamic Volume of Anionic Lipopolysaccharide, **Emulsan**, on Emulsifying Activity.
AUTHOR: KIM P; KIM S W; KIM J H
KIM S Y
CORPORATE SOURCE: Korea Advanced Inst. Sci. and Technol., Taejon, KOR
Dong Yang Confectionery Corp., Seoul, KOR
SOURCE: Biosci Biotechnol Biochem, (1998) vol. 62, no. 3, pp. 603-604. Journal Code: G0021A (Fig. 3, Ref. 8)
CODEN: BBBIEJ; ISSN: 0916-8451
PUB. COUNTRY: Japan
DOCUMENT TYPE: Journal; Short Communication
LANGUAGE: English
STATUS: New
AB To understand the structure-function relationship of an anionic lipopolysaccharide **emulsan**, the effect of hydrodynamic volume on the emulsifying activity was investigated. As a result, it was found that the hydrodynamic volume of **emulsan** was an important factor in its emulsifying activity. The hydrodynamic volume was decreased by the addition of a positively charged **polypeptide**, and the emulsifying activity was decreased, but negatively charged or uncharged **polypeptide** had little effect. These results suggest that the conformation of the backbone of **emulsan** helps to govern its emulsifying activity. (author abst.)

L5 ANSWER 12 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1997:294704 BIOSIS
DOCUMENT NUMBER: PREV199799593907
TITLE: Relationship between emulsifying activity and

carbohydrate backbone structure of **emulsan** from Acinetobacter **calcoaceticus** **RAG-1**.

AUTHOR(S): Kim, Pil; Oh, Deok-Kun (1); Kim, Sang-Yong; Kim, Jung-Hoe

CORPORATE SOURCE: (1) Dep. Biol. Sci., Korea Advanced Inst. Sci. and Technol., Daejoen 305-701 South Korea

SOURCE: Biotechnology Letters, (1997) Vol. 19, No. 5, pp. 457-459.
ISSN: 0141-5492.

DOCUMENT TYPE: Article

LANGUAGE: English

AB Various **emulsan** samples with the different degrees of branching of the carbohydrate backbone were obtained from Acinetobacter **calcoaceticus** under different culture conditions. The emulsifying activity of **emulsan** had a linear correlation to the branching degrees of the carbohydrate backbone (r-2 = 0.930) suggesting that the structure of carbohydrate backbone was an important factor influencing emulsifying activity.

L5 ANSWER 13 OF 50 MEDLINE DUPLICATE 4

ACCESSION NUMBER: 97270213 MEDLINE

DOCUMENT NUMBER: 97270213 PubMed ID: 9115094

TITLE: Bioengineering of emulsifier structure: **emulsan** analogs.

AUTHOR: Gorkovenko A; Zhang J; Gross R A; Allen A L; Kaplan D L

CORPORATE SOURCE: Department of Chemistry, University of Massachusetts Lowell 01854, USA.

SOURCE: CANADIAN JOURNAL OF MICROBIOLOGY, (1997 Apr) 43 (4) 384-90.
Journal code: CJ3; 0372707. ISSN: 0008-4166.

PUB. COUNTRY: Canada
Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199705

ENTRY DATE: Entered STN: 19970602
Last Updated on STN: 19970602
Entered Medline: 19970520

AB Strategies were investigated to modulate the side chain structure of **emulsans** formed by Acinetobacter **calcoaceticus** **RAG-1**. Analysis of **emulsan** fatty acid side chain groups by gas chromatography--mass spectrometry (GC-MS) revealed that by provoking the exogenous n-alkanoic fatty acids 15:0, 16:0, and 17:0, **emulsan** analogs were formed with 53, 46, and 44 mol%, respectively, of fatty acid substituents with chain lengths equal to that of the carbon source. In contrast, the

increase in **emulsan** fatty acids of chain lengths less than 15 or greater than 17 by providing corresponding shorter and longer chain length fatty acids as carbon sources was not substantial. When [1-13C]-labeled (99% enriched) palmitic acid was used as a carbon source along with acetate, analysis of M/z 75/74 and 87/88 isotopomer ratios by GC-MS indicated that 84 and 86% of the 16:0 (9-cis) side groups, respectively, were incorporated intact from the 16:0 carbon source. The percentage of 14- 15-, 16-, 17-, and 18-carbon chain length fatty acid esters that were monounsaturated were 11, 26, 50, 70, and 85% respectively. Based on the observed percentage of unsaturated chain length dependence and almost identical enrichment at C-1 of 16:0 and 16:1 (9-cis) side groups from [1-13 C]-labeled experiments, it was concluded that desaturation of preformed n-alkanoic acids was the predominant mechanism of their formation. Further work established correlations between side chain structure and product emulsification specificity/activity, so that bioengineered **emulsans** with improved selectivity can now be formed.

L5 ANSWER 14 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 97:456549 SCISEARCH
THE GENUINE ARTICLE: XD395
TITLE: Bioemulsans: Microbial polymeric emulsifiers
AUTHOR: Rosenberg E (Reprint); Ron E Z
CORPORATE SOURCE: TEL AVIV UNIV, DEPT MOL MICROBIOL & BIOTECHNOL, IL-69978 RAMAT AVIV, ISRAEL (Reprint)
COUNTRY OF AUTHOR: ISRAEL
SOURCE: CURRENT OPINION IN BIOTECHNOLOGY, (JUN 1997) Vol. 8, No. 3, pp. 313-316.
Publisher: CURRENT BIOLOGY LTD, 34-42 CLEVELAND STREET, LONDON, ENGLAND W1P 6LB.
ISSN: 0958-1669.
DOCUMENT TYPE: General Review; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 26
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Bioemulsans are amphipathic **proteins** and/or polysaccharides that stabilize oil-in-water emulsions. Bioemulsans are produced by a wide diversity of microorganisms and have potential applications in the food, paper, paint, bioremediation, agriculture, detergent and cosmetics industries. The production of the RAG-1 **emulsan** has been studied in batch-fed fermenters via self-cycling fermentation and with immobilized cells using a Celite support matrix. Bioemulsans have several advantages over lower molecular weight emulsifiers presently used in industry. The last few years have seen a number of new bioemulsans described with commercial applications. (C) Current Biology Ltd.

L5 ANSWER 15 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 97:491047 SCISEARCH
THE GENUINE ARTICLE: XG083
TITLE: Protective functions of exopolysaccharides produced by an Acinetobacter sp.
AUTHOR: Pirog T P (Reprint); Grinberg T A; Malashenko Y R
CORPORATE SOURCE: NATL ACAD SCI UKRAINE, INST MICROBIOL & VIROL, ZABOLOTNY ST 154, UA-252143 KIEV, UKRAINE (Reprint)
COUNTRY OF AUTHOR: UKRAINE
SOURCE: MICROBIOLOGY, (MAY-JUN 1997) Vol. 66, No. 3, pp. 279-283.
Publisher: MAIK NAUKA/INTERPERIODICA, C/O PLENUM/CONSULTANTS BUREAU 233 SPRING ST, NEW YORK, NY 10013.
ISSN: 0026-2617.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 13
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The effect of exopolysaccharides (EPS) on the response of exponential and stationary cells of an Acinetobacter sp, to different unfavorable ambient factors was studied. EPS synthesized by Acinetobacter sp. under optimum growth conditions were found to protect the **bacterium** from extreme pH values, elevated temperature, drying, freezing, biocides, and detergents. Exponential cells showed a higher tolerance to some of the effecters studied. The relationship between the physiological state of Acinetobacter sp. cells and the protective abilities of EPS is discussed.

L5 ANSWER 16 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 5
ACCESSION NUMBER: 1997:499954 BIOSIS
DOCUMENT NUMBER: PREV199799799157
TITLE: Biological modification of hydrophobic group in Acinetobacter **calcoaceticus RAG-1 emulsan.**
AUTHOR(S): Kim, Sang-Yong; Oh, Deok-Kun (1); Kim, Jung-Hoe
CORPORATE SOURCE: (1) Dep. Food Sci. Technol., Woosuk Univ., Cheonju 565-800 Japan
SOURCE: Journal of Fermentation and Bioengineering, (1997) Vol. 84, No. 2, pp. 162-164.
ISSN: 0922-338X.
DOCUMENT TYPE: Article
LANGUAGE: English

AB The fatty acid group in Acinetobacter **calcoaceticus emulsan** was modified by using different carbon sources. The major components of the fatty acid group were 3-hydroxydodecanoic

acid (3-HDDA), hexadecanoic acid, and octadecenoic acid. Among these, 3-HDDA was found to have the most important influence on the emulsifying activity of the **emulsan**.

L5 ANSWER 17 OF 50 MEDLINE DUPLICATE 6
ACCESSION NUMBER: 97264348 MEDLINE
DOCUMENT NUMBER: 97264348 PubMed ID: 9110181
TITLE: Incorporation of 2-hydroxyl fatty acids by Acinetobacter **calcoaceticus RAG-1** to tailor **emulsan** structure.
AUTHOR: Zhang J; Gorkovenko A; Gross R A; Allen A L; Kaplan D
CORPORATE SOURCE: University of Massachusetts Lowell, Department of Chemistry 01854, USA.
SOURCE: INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES, (1997 Feb) 20 (1) 9-21.
Journal code: AY6; 7909578. ISSN: 0141-8130.
PUB. COUNTRY: ENGLAND: United Kingdom
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199706
ENTRY DATE: Entered STN: 19970620
Last Updated on STN: 19980206
Entered Medline: 19970612

AB Acinetobacter **calcoaceticus RAG-1** was cultured on different chain length saturated 2-hydroxyl fatty acid (2-HOFA) carbon sources as follows: C12:0 (2-OH), C14:0 (2-OH), C16:0 (2-OH) and C18:0 (2-OH). These 2-HOFAs were used as either sole carbon sources or cosubstrates with C14:0 (total 1% w/v) to form new **emulsans** (EMs) having controlled side chain FA structure and, therefore, unique emulsifier characteristics. EM yields and cell dry weights ranged from 0.6 to 1.8 g/l and 0.9 to 3.9 g/l, respectively, depending on the carbon source(s) and the cultivation conditions. The content of C12:0 (2-OH) EM substituents reached high levels (306 nmol/mg-EM, 64.4 mol% of total FAs) by selectively feeding this FA. Substantial quantities of 2-HOFAs with chain lengths > or = C14-up to 96 nmol/mg-EM or 15.2 mol% for C16:0 (2-OH)-were also incorporated in EMs by providing the corresponding 2-HOFA carbon source in the medium. By increasing the medium 2-HOFA concentration large increases in EM total FA contents resulted. The EM FA content was as high as 955 nmol/mg-EM or 23 wt% for a culture containing 0.75 g/100 ml C18:0 (2-OH). An important metabolic pathway involved in EM side chain formation from C16:0 (2-OH) and C18:0 (2-OH) involves decarboxylation, oxidation of the alkanol to the corresponding n-1 FA-CoA intermediate and formation of odd chain length substituent side chain linkages by an EM acyl transferase. Addition of the enzyme alkylating agent iodoacetamide to cultures was used to: (i) enhance the incorporation into EMs of both C12:0

(2-OH) and C16:0 (2-OH) substituents; and (ii) increase by 1.3 to 1.8 fold (by wt.) the total EM FA content. Finally, it was concluded that enhanced emulsification activity of EMs is not necessarily achieved by forming products with relatively high 2- and 3-hydroxydodecanoic acid contents.

L5 ANSWER 18 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 96:141018 SCISEARCH
THE GENUINE ARTICLE: TV328
TITLE: EMULSIFIER PRODUCTION AND MICROSCOPIC STUDY OF EMULSIONS AND BIOFILMS FORMED BY THE HYDROCARBON-UTILIZING **BACTERIA** ACINETOBACTER-**CALCOACETICUS** MM5
AUTHOR: MARIN M; PEDREGOSA A; LABORDA F (Reprint)
CORPORATE SOURCE: UNIV ALCALA DE HENARES, DEPT MICROBIOL & PARASITOL, CARRETERA MADRID BARCELONA, KM 33, E-28871 ALCALA DE HENARES, SPAIN (Reprint); UNIV ALCALA DE HENARES, DEPT MICROBIOL & PARASITOL, E-28871 ALCALA DE HENARES, SPAIN
COUNTRY OF AUTHOR: SPAIN
SOURCE: APPLIED MICROBIOLOGY AND BIOTECHNOLOGY, (JAN 1996) Vol. 44, No. 5, pp. 660-667.
ISSN: 0175-7598.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE; AGRI
LANGUAGE: ENGLISH
REFERENCE COUNT: 33
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB A **bacterial** strain was isolated from a sample of contaminated heating oil and identified as a strain of Acinetobacter **calcoaceticus**, named MM5. The **bacterial** isolate was able to grow on petroleum derivatives and brought about an emulsification of those compounds. A bioemulsifier was extracted from the culture medium of MM5 strain and partially characterized. This compound was able to emulsify petroleum fuels and both aliphatic and aromatic pure hydrocarbons and was stable over a wide range of temperatures. Studies developed by light, scanning electron and transmission electron microscopy showed that, during the growth on petroleum derivatives, the microorganisms were orientated on the surface of drops enclosed in a skin or membranous polymer produced by the **bacteria**. These droplets may represent the hydrocarbon/water emulsion of the liquid culture. The growth of A. **calcoaceticus** MM5 on media containing both hydrocarbon and water-soluble substrates as carbon sources also results in the formation of a film, consisting of amorphous and membranous layers. The **bacteria** were connected to the biofilm and showed intercellular contacts through cell-surface appendages, forming a complex network. The importance of the biofilms for

bacterial adhesion to oil droplets and for its nourishment is discussed.

L5 ANSWER 19 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 7
ACCESSION NUMBER: 1996:218666 BIOSIS
DOCUMENT NUMBER: PREV199698774795
TITLE: Effects of ethanol and phosphate on **emulsan** production by Acinetobacter **calcoaceticus RAG-1**.
AUTHOR(S): Choi, Jeong-Woo (1); Choi, Hyun-Goo; Lee, Won-Hong
CORPORATE SOURCE: (1) Dep. Chem. Eng., Sogang Univ., CPO Box 1142, Seoul South Korea
SOURCE: Journal of Biotechnology, (1996) Vol. 45, No. 3, pp. 217-225.
ISSN: 0168-1656.
DOCUMENT TYPE: Article
LANGUAGE: English
AB To enhance **emulsan** production, the effects of ethanol and phosphate on cell growth and **emulsan** synthesis by Acinetobacter **calcoaceticus RAG-1** were investigated in batch cultivations. It was observed that an optimal concentration of ethanol and phosphate existed for the maximization of **emulsan** production in batch cultivations. High concentrations of ethanol (above 10 g l-1) inhibited cell growth, which resulted in decreased **emulsan** synthesis rates. Optimum level of ethanol for **emulsan** production (about 6.5 g l-1) was decided to maximize the specific growth rate and specific production rate of **emulsan**. High concentrations of phosphate (above 18.15 g l-1) inhibited cell growth and **emulsan** production. The intracellular phosphate level affected the specific growth rate. The optimum level of phosphate for **emulsan** production (about 12.1 g l-1) was identified in order to maximize the specific growth rate as well as the specific production rate. In a fed-batch cultivation, high volumetric production of **emulsan** was achieved by continuous feeding of ethanol and phosphate to maintain ethanol and phosphate concentrations at the optimal level.

L5 ANSWER 20 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 8
ACCESSION NUMBER: 1996:507332 BIOSIS
DOCUMENT NUMBER: PREV199699229688
TITLE: Control of ethanol concentration in a fed-batch cultivation of Acinetobacter **calcoaceticus RAG-1** using a feedback-assisted interactive learning algorithm.
AUTHOR(S): Choi, Jeong-Woo (1); Choi, Hyun-Goo; Lee, Kwang-Soon; Lee, Won-Hong
CORPORATE SOURCE: (1) Dep. Chem. Eng., Sogang Univ., C.P.O. Box 1142,

Seoul South Korea
SOURCE: Journal of Biotechnology, (1996) Vol. 49, No. 1-3, pp. 29-43.
ISSN: 0168-1656.
DOCUMENT TYPE: Article
LANGUAGE: English

AB A control scheme using a feedback-assisted iterative learning control algorithm to maintain the optimal ethanol concentration for the enhancement of cell growth and **emulsan** production in fed-batch cultivation of Acinetobacter **calcoaceticus** **RAG-1** is presented. The optimal concentration of ethanol for cell growth and **emulsan** production was determined by considering the inhibitory effect of ethanol. To maintain the optimal concentration of ethanol, continuous feeding of ethanol was adopted using the feedback-assisted iterative learning control algorithm. A mathematical kinetic model is used to simulate the objective process. The transfer function of the objective process was approximated to the FOPDT (First Order Plus Dead Time) model and model parameters were determined by the LSE (Least Square Estimation) method. In the transfer function modeling, to evaluate the process model parameters which can describe the objective process, the disturbance included in the process was eliminated by linearization of two data sets of preliminary fed-batch runs. Fed-batch cultivation experiments using a feedback-assisted learning control algorithm were performed. The results showed that the convergence performance was improved as the run was iterated and the **emulsan** yield was increased compared with that of the rats controlled by only the feedback loop.

L5 ANSWER 21 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 95:616086 SCISEARCH
THE GENUINE ARTICLE: RT798
TITLE: ALASAN, A NEW BIOEMULSIFIER FROM ACINETOBACTER RADIORESISTENS
AUTHOR: NAVONVENEZIA S; ZOSIM Z; GOTTLIEB A; LEGMANN R; CARMELI S; RON E Z; ROSENBERG E (Reprint)
CORPORATE SOURCE: TEL AVIV UNIV, GEORGE S WISE FAC LIFE SCI, DEPT MOLEC MICROBIOL & BIOTECHNOL, IL-69978 TEL AVIV, ISRAEL (Reprint); TEL AVIV UNIV, GEORGE S WISE FAC LIFE SCI, DEPT MOLEC MICROBIOL & BIOTECHNOL, IL-69978 TEL AVIV, ISRAEL; TEL AVIV UNIV, SCH CHEM, IL-69978 TEL AVIV, ISRAEL
COUNTRY OF AUTHOR: ISRAEL
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (SEP 1995) Vol. 61, No. 9, pp. 3240-3244.
ISSN: 0099-2240.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE; AGRI

LANGUAGE: ENGLISH
REFERENCE COUNT: 23
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Acinetobacter radioresistens KA53, isolated by enrichment culture, was found to produce an extracellular, nondialyzable emulsifying agent (referred to as alasan) when grown on ethanol medium in a batch-fed reactor, The crude emulsifier was concentrated from the cell-free culture fluid by ammonium sulfate precipitation to yield 2.2 g of emulsifier per liter, Alasan stabilized a variety of oil-in-water emulsions, including n-alkanes with chain lengths of 10 or higher, alkyl aromatics, liquid paraffin, soybean and coconut oils, and crude oil. Alasan was 2.5 to 3.0 times more active after being heated at 100 degrees C under neutral or alkaline conditions, Emulsifying activity was observed over the entire pH range studied (pH 3.3 to 9.2), with a clear maximum at pH 5.0. Magnesium ions stimulated the activity both below (pH 3.3 to 4.5) and above (pH 5.5 to 9.3) the pH optimum. Alasan activity was higher in 20 mM citrate than in 20 mM acetate or Tris-HCl buffer, Preliminary chemical characterization of alasan indicated that it is a complex of an anionic, high-molecular-weight, alanine-containing heteropolysaccharide and **protein**.

L5 ANSWER 22 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 95:846525 SCISEARCH
THE GENUINE ARTICLE: TH817
TITLE: BIODEGRADATION OF DIESEL AND HEATING OIL BY ACINETOBACTER-**CALCOACETICUS** MM5 - ITS POSSIBLE APPLICATIONS ON BIOREMEDIATION
AUTHOR: MARIN M (Reprint); PEDREGOSA A; RIOS S; ORTIZ M L; LABORDA F
CORPORATE SOURCE: UNIV ALCALA DE HENARES, DEPT MICROBIOL & PARASITOL, CARRETERA MADRID BARCELONA, KM 336, E-28871 ALCALA DE HENARES, SPAIN (Reprint)
COUNTRY OF AUTHOR: SPAIN
SOURCE: INTERNATIONAL BIODETERIORATION & BIODEGRADATION, (1995) Vol. 35, No. 1-3, pp. 269-285.
ISSN: 0964-8305.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: AGRI
LANGUAGE: ENGLISH
REFERENCE COUNT: 37
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Twenty aerobic **bacterial** strains were isolated from altered heating oil. Among them the strain catalogued as MM5 and identified as Acinetobacter **calcoaceticus** is able to grow on hydrocarbon substrates. When sti ain MM5 was grown on heating oil, crude oil and tetradecane, increases of **protein** concentration and of caprilate-lipase and acetate-esterase enzymatic

activities were observed in the culture filtrate, with a simultaneous pH drop. A strong emulsification of petroleum by-products was also noticed. Degradation of heating oil was followed by gas chromatography and infrared spectroscopy. Presence of available nitrogen and phosphorus sources were essential for hydrocarbon biodegradation, Intracellular electron transparent inclusions were observed by transmission electron microscopy when strain MM5 cells were grown on hydrocarbons. Light and scanning electron microscopy showed **bacteria** interconnected by an extracellular polymer and attached to hydrocarbon droplets and to sheets of polymeric material. A bioemulsifier was extracted from the cell-free culture supernatants of strain MM5 grown on tetradecane. The emulsifier is a high molecular weight product that comprises **proteins**, sugars and fatty acids and which is resistant to high temperature. Strain MM5 should be helpful for the design of strategies for the bioremediation of hydrocarbon contaminated sites.

L5 ANSWER 23 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 95:642940 SCISEARCH
THE GENUINE ARTICLE: RV262
TITLE: DETECTION OF ALPHA/BETA-HYDROLASE FOLD IN THE CELL-SURFACE ESTERASES OF ACINETOBACTER SPECIES USING AN ANALYSIS OF 3D PROFILES
AUTHOR: ALON R N; MIRNY L; SUSSMAN J L; GUTNICK D L (Reprint)
CORPORATE SOURCE: TEL AVIV UNIV, GEORGE S WISE FAC LIFE SCI, DEPT MOLEC MICROBIOL & BIOTECHNOL, IL-69978 RAMAT AVIV, ISRAEL (Reprint); TEL AVIV UNIV, GEORGE S WISE FAC LIFE SCI, DEPT MOLEC MICROBIOL & BIOTECHNOL, IL-69978 RAMAT AVIV, ISRAEL; WEIZMANN INST SCI, DEPT BIOL STRUCT, IL-76100 REHOVOT, ISRAEL; BROOKHAVEN NATL LAB, DEPT BIOL, UPTON, NY, 11973; BROOKHAVEN NATL LAB, DEPT CHEM, UPTON, NY, 11973
COUNTRY OF AUTHOR: ISRAEL; USA
SOURCE: FEBS LETTERS, (11 SEP 1995) Vol. 371, No. 3, pp. 231-235.
ISSN: 0014-5793.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE
LANGUAGE: ENGLISH
REFERENCE COUNT: 15
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The primary sequence of esterases from Acinetobacter lwoffii **RAG-1** and A. **calcoaceticus** BD413 were compared with linearized structural sequences of two hundred **proteins** selected from Brookhaven **Protein** DataBank using a modified version of the Bowie et al, algorithm [3]. Significant structural homology was found to alpha/beta

proteins and specifically to those with the alpha/beta-hydrolase fold for,which the crystal structure was reported. No such homology was detected using common primary sequence alignment programs such as FASTA or BLAST.

L5 ANSWER 24 OF 50 SCISEARCH COPYRIGHT 2001 ISI (R)
ACCESSION NUMBER: 95:478072 SCISEARCH
THE GENUINE ARTICLE: RH451
TITLE: NOVEL BIOEMULSIFIERS FROM MICROORGANISMS FOR USE IN FOODS
AUTHOR: SHEPHERD R; ROCKEY J; SUTHERLAND I W; ROLLER S (Reprint)
CORPORATE SOURCE: S BANK UNIV, SCH APPL SCI, 103 BOROUGH RD, LONDON SE1 0AA, ENGLAND (Reprint); S BANK UNIV, SCH APPL SCI, LONDON SE1 0AA, ENGLAND; LEATHERHEAD FOOD RES ASSOC, LEATHERHEAD KT22 7RY, SURREY, ENGLAND; UNIV EDINBURGH, DIV BIOL, EDINBURGH EH9 3JH, MIDLOTHIAN, SCOTLAND
COUNTRY OF AUTHOR: ENGLAND; SCOTLAND
SOURCE: JOURNAL OF BIOTECHNOLOGY, (21 JUN 1995) Vol. 40, No. 3, pp. 207-217.
ISSN: 0168-1656.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE; AGRI
LANGUAGE: ENGLISH
REFERENCE COUNT: 48
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The main objective of this study was to test a range of microorganisms for production of extracellular, high molecular weight emulsifiers for potential use in foods. A standard emulsification assay developed specifically for assessing food emulsifiers was used to examine 24 extracellular microbial products from **bacteria**, yeasts and algae. Of the 24 products tested, nine had emulsification ability that was as good as and eight had emulsifying properties that were better than those of the commonly used food emulsifiers gum arabic and carboxymethylcellulose. The eight good producer organisms included the yeasts Candida utilis, Candida valida, Hansenula anomala, Rhodospiridium diobouatum and Rhodotorula graminis, the red alga Porphiridium cruentum, and the **bacteria** Klebsiella spp. and Acinetobacter **calcoaceticus**. Of these, C. utilis was selected for further study due to the excellent emulsification properties of its extracellular products and the food-grade status of the organism. Crude preparations of the bioemulsifier from C. utilis exhibited low viscosity and had a carbohydrate content of over 80%. Preliminary trials showed that the bioemulsifier from this organism had potential for use in salad cream.

L5 ANSWER 25 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1994:463688 BIOSIS
DOCUMENT NUMBER: PREV199497476688
TITLE: Control of side chain fatty acid composition for the natural bioemulsifier **emulsan** produced by Acinetobacter **calcoaceticus** strain **RAG-1**.
AUTHOR(S): Gross, Richard A. (1); Kim, Jung H. (1); Gorkovenko, Alexander (1); Kaplan, David L.; Allen, Alfred L.; Ball, Derek
CORPORATE SOURCE: (1) Univ. Mass. Lowell, Dep. Chemistry, One University Avenue, Lowell, MA 01854 USA
SOURCE: Abstracts of Papers American Chemical Society, (1994) Vol. 208, No. 1-2, pp. ENVR 73.
Meeting Info.: 208th National Meeting of the American Chemical Society Washington, D.C., USA August 21-25, 1994
ISSN: 0065-7727.
DOCUMENT TYPE: Conference
LANGUAGE: English

L5 ANSWER 26 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1993:511394 BIOSIS
DOCUMENT NUMBER: PREV199345110019
TITLE: Biosurfactants from marine microorganisms.
AUTHOR(S): Lang, Siegmund; Wagner, Fritz
CORPORATE SOURCE: Inst. Biochem. Biotechnol., Technical Univ. Braunschweig, Braunschweig Germany
SOURCE: Kosaric, N. [Editor]. Surfactant Science Series, (1993) Vol. 48, pp. 391-417. Surfactant Science Series; Biosurfactants: Production, properties, applications.
Publisher: Marcel Dekker, Inc. 270 Madison Avenue, New York, New York 10016, USA.
ISSN: 0081-9603. ISBN: 0-8247-8811-7.
DOCUMENT TYPE: Article
LANGUAGE: English

L5 ANSWER 27 OF 50 MEDLINE
ACCESSION NUMBER: 93298284 MEDLINE
DOCUMENT NUMBER: 93298284 PubMed ID: 7763670
TITLE: Pan Award. Microbial diversity as a source of useful biopolymers.
AUTHOR: Rosenberg E
CORPORATE SOURCE: Department of Molecular Microbiology & Biotechnology, Tel Aviv University, Ramat Aviv, Israel.
SOURCE: JOURNAL OF INDUSTRIAL MICROBIOLOGY, (1993 May) 11 (3) 131-7.

Journal code: ALF; 8610887. ISSN: 0169-4146.
PUB. COUNTRY: Netherlands
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: B
ENTRY MONTH: 199307
ENTRY DATE: Entered STN: 19950809
Last Updated on STN: 19950809
Entered Medline: 19930726

L5 ANSWER 28 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 9
ACCESSION NUMBER: 1992:475591 BIOSIS
DOCUMENT NUMBER: BA94:106966
TITLE: HYDROCARBON DEGRADATION BY ACINETOBACTER-**CALCOACETICUS RAG-1** USING THE SELF-CYCLING FERMENTATION TECHNIQUE.
AUTHOR(S): BROWN W A; COOPER D G
CORPORATE SOURCE: DEP. CHEM. ENG., MCGILL UNIV., MONTREAL, QUE. H3A 2A7, CAN.
SOURCE: BIOTECHNOL BIOENG, (1992) 40 (7), 797-805.
CODEN: BIBIAU. ISSN: 0006-3592.
FILE SEGMENT: BA; OLD
LANGUAGE: English
AB The use of self-cycling fermentations (SCFs) as a method for dealing with insoluble carbon substrates was examined. The **emulsan** -producing Acinetobacter **calcoaceticus** RAG-1was used as the test organism. Limiting concentrations of hexadecane, 1-hexadecene, or 1-chlorohexadecane were used as the carbon substrate. The parameters monitored were residual hydrocarbon concentration, cycle time (doubling time), biomass concentration and **emulsan** concentration. Cycle-to-cycle variations of the measured parameters were found to be small. In all cases, no residual hydrocarbon was detected. The minimum dissolved oxygen concentration was found to correspond with the complete disappearance of the carbon source. A correlation between minimum dissolved oxygen concentration, biomass concentration, and **emulsan** concentration was noted, thus making it easy to determine when steady-state conditions had been reached with respect to biomass and **emulsan** concentrations. The specific **emulsan** and biomass yields were found to increase during early stages of the fermentation, attaining their respective maxima at steady-state. Foaming problems often associated with the complete utilization of the insoluble substrate were eliminated using SCF technology, because harvesting occurs immediately following carbon depletion. From the results, SCFs provide a convenient method by which to produce and harvest **emulsan**.

L5 ANSWER 29 OF 50 MEDLINE DUPLICATE 10

ACCESSION NUMBER: 91175636 MEDLINE
DOCUMENT NUMBER: 91175636 PubMed ID: 2078530
TITLE: Production of exopolysaccharides by Acinetobacter strains in a controlled fed-batch fermentation process using soap stock oil (SSO) as carbon source.
AUTHOR: Shabtai Y
CORPORATE SOURCE: Department of Biotechnology, George S. Wise Faculty of Life Sciences, Tel-Aviv University, Israel.
SOURCE: INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES, (1990 Apr) 12 (2) 145-52.
Journal code: AY6; 7909578. ISSN: 0141-8130.
PUB. COUNTRY: ENGLAND: United Kingdom
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199105
ENTRY DATE: Entered STN: 19910519
Last Updated on STN: 19910519
Entered Medline: 19910501

AB The production of two extracellular capsular heteropolysaccharides by two different Acinetobacter strains has been studied in separate controlled fermentation processes with a view to their industrial applications as specific dispersing agents. The first, **emulsan**, is an extracellular polyanionic amphipathic heteropolysaccharide (MW 10(6) D) made by A. **calcoaceticus RAG-1**. It forms and stabilizes oil in water emulsions. The other, biodispersan (PS-A2), is another extracellular zwitterionic heteropolysaccharide (MW 51 kD) made by A. **calcoaceticus** A2. This polysaccharide disperses big solid limestone granules forming micron-size water suspension. Both polysaccharides are synthesized within the cells, exported to their outer surface to form an extracellular cell-associated capsule and released subsequently into the growth medium. The polymers were produced in a computer-controlled fed-batch intensively aerated fermentation process. A commercially available and cheap fatty acids mixture (soap stock oil) served as the carbon source, and was fed in coordination with the required nitrogen. The coordinated feed of carbon and nitrogen was operated on the basis of two metabolic correlations: The first correlation related the cell **protein** produced and the ammonium nitrogen consumed with the outcoming coeffients of 24 and 21 mM NH3/g **protein** for the **emulsan** and the biodispersan fermentations respectively. The second correlation linked the consumption of the fatty acids with that of the nitrogen source dictating the appropriate C/N ratio of the feed into the operating fermentor. These ratios were 7.7 g C/g N for the **emulsan** fermentation and 8.5 gC/g N in the case of the biodispersan production process.(ABSTRACT TRUNCATED AT 250 WORDS)

L5 ANSWER 30 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1991:3466 BIOSIS
DOCUMENT NUMBER: BA91:3466
TITLE: **EMULSAN** A NOVEL TYPE OF INDUSTRIALLY IMPORTANT EXTRACELLULAR BIOPOLYMERS.
AUTHOR(S): PIROG T P; GRINBERG T A; DERYABIN V V; MALASHENKO YU R
CORPORATE SOURCE: INST. MICROBIOL. VIROL., ACAD. SCI. UKR. SSR, KIEV, USSR.
SOURCE: BIOTEKHNOLOGIYA, (1990) 0 (4), 3-6.
CODEN: BTKNEZ. ISSN: 0234-2758.
FILE SEGMENT: BA; OLD
LANGUAGE: Russian
AB The data of the production of a novel type of industrially important extracellular biopolymers-emulsan-**are** reviewed. The problems of selection and improvement of the strain-producent, its growth properties and formation of the biopolymer on ethanol and carbohydrate substrates are considered. The physico-chemical properties of the biopolymer and the perspective of its employment in different branches of industry are also discussed.

L5 ANSWER 31 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1990:3280 BIOSIS
DOCUMENT NUMBER: BA89:3280
TITLE: ADHERENCE OF **EMULSAN**-PRODUCING ACINETOBACTER-**CALCOACETICUS** TO HYDROPHOBIC LIQUIDS.
AUTHOR(S): NG T K; HU W S
CORPORATE SOURCE: DEP. CHEM. ENG. MATER. SCI., UNIV. MINN., 421 WASHINGTON AVE. S.E., MINNEAPOLIS, MINN. 55455, USA.
SOURCE: APPL MICROBIOL BIOTECHNOL, (1989) 31 (5-6), 480-485.
CODEN: AMBIDG. ISSN: 0175-7598.
FILE SEGMENT: BA; OLD
LANGUAGE: English
AB The adherence of Acinetobacter **calcoaceticus** ATCC 31012 cells to hexadecane and perfluorocarbon FC-43 was measured using the **Bacterial** Adherence to Hydrocarbon (BATH) assay. In batch culture the adherence of cells to both hydrophobic liquids increased sharply during the exponential growth phase and remained high for the remainder of the culture period. No correlation was found between the surface **emulsan** concentration and the adherence to perfluorocarbon FC-43 and hexadecane. In continuous cultures, the production of cell-free **emulsan** was found to be growth-associated. The adherence to both hydrophobic liquids decreased with increasing dilution rate while the amount of surface **emulsan** increased. Furthermore, exogenously added **emulsan** decreased the adherence to hydrophobic liquids.

Thus, the accumulation of surface **emulsan** does not appear to have a beneficial effect for cell adherence to hydrophobic liquids.

L5 ANSWER 32 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1990:3371 BIOSIS
DOCUMENT NUMBER: BA89:3371
TITLE: EFFECT OF **PROTEIN** ON THE EMULSIFYING ACTIVITY OF **EMULSAN**.
AUTHOR(S): ZOSIM Z; FLEMINGER G; GUTNICK D; ROSENBERG E
CORPORATE SOURCE: GEORGE S. WISE FAC. LIFE SCI., DEP. MICROBIOL., TEL AVIV UNIV., P.O. BOX 39040, RAMAT AVIV, ISR. 69978.
SOURCE: J DISPERSION SCI TECHNOL, (1989) 10 (3), 307-317.
CODEN: JDTEDS. ISSN: 0193-2691.
FILE SEGMENT: BA; OLD
LANGUAGE: English
AB Many bioemulsifiers are polymers produced by hydrocarbon-degrading **bacteria**. The best studied example is **emulsan**, an extracellular product of the Acinetobacter **calcoaceticus** strain **RAG-1**. **Emulsan** is an amphipathic lipopolysaccharide contaiign varying quantities of non-covalently bound **protein**. The latter was shown to enhance significantly the emulsifying activity of deproteinized **emulsan** towards aliphatic and aromatic hydrocarbons. The **protein** component was seprated from **emulsan** by treatment with **emulsan** depolymerase folloewd by column chromatogrphy. The **protein** fraction responsible for emulsifying activity enhancement appeared as a high molecular weight aggregate contaiing a major subunit of 29 kD. The latter was also detected by SDS-PAG electrophoresis of the initial and fractionated **emulsan**. The data are discussed in terms of the concept that **protein**/polysaccharide structure form mixed interfacial layers with higher stability than either polymer by itself.

L5 ANSWER 33 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS DUPLICATE 11
ACCESSION NUMBER: 1989:123548 BIOSIS
DOCUMENT NUMBER: BA87:58201
TITLE: EFFECT OF **EMULSAN** ON BIODEGRADATION OF CRUDE OIL BY PURE AND MIXED **BACTERIAL** CULTURES.
AUTHOR(S): FOGHT J M; GUTNICK D L; WESTLAKE D W S
CORPORATE SOURCE: DEP. MICROBIOL., UNIV. ALBERTA, EDMONTON, ALBERTA, CAN. T6G 2E9.
SOURCE: APPL ENVIRON MICROBIOL, (1989) 55 (1), 36-42.
CODEN: AEMIDF. ISSN: 0099-2240.
FILE SEGMENT: BA; OLD
LANGUAGE: English
AB Crude oil was treated with purified **emulsan**, the

heteropolysaccharide bioemulsifier produced by Acinetobacter **calcoaceticus RAG-1**. A mixed **bacterial** population as well as nine different pure cultures isolated from various sources was tested for biodegradation of **emulsan**-treated and untreated crude oil. Biodegradation was measured both quantitatively and qualitatively. Recovery of 14CO2 from mineralized 14C-labeled substrates yielded quantitative data on degradation of specific compounds, and capillary gas chromatography of residual unlabeled oil yielded qualitative data on a broad spectrum of crude oil components. Biodegradation of linear alkanes and other saturated hydrocarbons, both by pure cultures and by the mixed population, was reduced some 50 to 90% after **emulsan** pretreatment. In addition, degradation of aromatic compounds by the mixed population was reduced some 90% in **emulsan**-treated oil. In sharp contrast, aromatic biodegradation by pure cultures was either unaffected or slightly stimulated by emulsification of the oil.

L5 ANSWER 34 OF 50 WPIDS COPYRIGHT 2001 DERWENT INFORMATION LTD
ACCESSION NUMBER: 1987-293661 [42] WPIDS
CROSS REFERENCE: 1986-107809 [17]
DOC. NO. CPI: C1987-124649
TITLE: Topically applied creams or lotions - contg. a microbially-derived bio-emulsifier to prevent coalescence of hydrocarbon droplets.
DERWENT CLASS: B04 D16 D21
INVENTOR(S): HAYES, M E
PATENT ASSIGNEE(S): (PETR-N) PETROLEUM FERMENTATION NV; (EMUL-N) EMULSAN BIOTECH INC; (PETR-N) PETRO FERMENTATIONS
COUNTRY COUNT: 15
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
EP 242296	A	19871021	(198742)*	EN	56
R: AT BE CH DE ES FR GB IT LI LU NL SE					
JP 63072615	A	19880402	(198819)		
US 4870010	A	19890926	(198948)		13
US 4999195	A	19910312	(199113)		
CA 1300512	C	19920512	(199225)		
JP 2505198	B2	19960605	(199627)		15

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
EP 242296	A	EP 1987-400855	19870415
JP 63072615	A	JP 1987-91111	19870415

US 4870010	A	US 1986-852272	19860415
US 4999195	A	US 1989-375436	19890705
CA 1300512	C	CA 1987-534588	19870413
JP 2505198	B2	JP 1987-91111	19870415

FILING DETAILS:

PATENT NO	KIND		PATENT NO
JP 2505198	B2	Previous Publ.	JP 63072615

PRIORITY APPLN. INFO: US 1986-852272 19860415; US 1984-662931 19841016; US 1989-375436 19890705

AN 1987-293661 [42] WPIDS

CR 1986-107809 [17]

AB EP 242296 A UPAB: 19970502

In a skin cleansing cream or lotion, the improvement comprises the addn. to the compsn. of 0.02-0.5 wt.% of a microbially-derived bioemulsifier (I) which predominantly resides at hydrocarbon/water interfaces to surround hydrocarbon droplets in hydrocarbon-in-water emulsions. (I) is characterised by its ability to maintain emulsion stability by effectively preventing coalescence of hydrocarbon droplets.

Also claimed are topically applied cosmetic creams or lotions contg. (I). Prefd. (I) are produced by Acinetobacter calcaceticus an are e.g. alpha-**emulsan**, apo-alpha-**emulsan**, psi-**emulsan**, beta-**emulsan** or apo-psi-**emulsan**

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USE/ADVANTAGE - In addn. to imparting aesthetically pleasing characteristics to skin and hair, leaving the skin smooth and creamy and the hair conditioned, shiny and free of static build-up, the (I)-contg. prods., when used regularly can bring about certain hygienically and mechanically beneficial effects. Soaps, cleansing creams, cleansing lotions and shampoos contg. **emulsans** have beneficial effects on such common skin and scalp conditions as acne, oily skin, dermatitis, dandruff, psoriasis, eczema and razor burn and are therefore potentially useful as medicaments for the treatment and/or control of these or other dermatological conditions.

Dwg.0/0

ABEQ DE 3586194 G UPAB: 19930922

A skin or hair cleansing compsn. is improved by adding 0.02-0.5 wt.% of a microbial bioemulsifier (I). (I) concentrates at the hydrocarbon (A)-water interface, so surrounds (A) droplets in (A)-in-water emulsions and maintains emulsion stability by preventing coalescence of the droplets. Pref. (I) is prod. by Acinetobacter **calcoaceticus** ATCC 31012, NRRL B-15616, B-15847, B-15848, B-15849, B-15850 or B-15860, and esp. in an alpha-

or beta-**emulsan** or a lipoheteropolysaccharide biopolymer, esp. the viscoemulsan from ATCC 31926.

USE/ADVANTAGE - (I) can be incorporated into bar or liq. soaps, and into shampoos. Soaps contg. (I) provide a creamy lather and leave the skin feeling smooth. Shampoos contg. (I) provide better degreasing and cleansing power for residues left on the hair by fixatives, and leave the hair conditioned with improved shine. Washing with compsns. contg. (I) is also useful for treatment of dermatitis, acne, psoriasis, eczema, razor burn and dandruff.

ABEQ EP 178443 B UPAB: 19930922

A composition containing from 0.02 to 0.5% by weight of a bioemulsifier produced by a **bacterium** of the Acinetobacter **calcoaceticus** species, for its use as an active pharmaceutical substance.

ABEQ US 4870010 A UPAB: 19930922

Skin cleansing cream or lotion, shampoo or soap for topical application to skin or scalp contains 0.02 wt.% or more of bioemulsifier produced by Acinetobacter **calcoaceticus**. Emulsifier has specific emulsification activity 25 units per mg. or more, can remove sebum, and can interfere with microbial adhesion on skin or hair.

A. **calcoaceticus** species is ATCC 31012, NRRL B-15847, NRRL B-15848, NRRL B-15849, NRRL B-15850, or NRRL B-15860. Bio-emulsifier comprises alpha **emulsan**, apo-alpha-emulsion, psi-emulsion, apo-psi-emulsion, beta-**emulsan**, or lipoheteropoly-saccharides.

USE - As thickeners, suspending agents, moisturisers, or conditioners.

ABEQ US 4999195 A UPAB: 19930922

Moisturising cream or lotion comprises 0.02 wt.% or more of bioemulsifier prod. by Acinetobacter colcoaceticus species. Bioemulsifier has specific emulsifications activity of 25 units per mg or more, can remove sebum, and can interfere with microbial adhesion on skin or hair.

Pref. bioemulsifier comprises alpha-**emulsan**, apo-alpha-**emulsan**, psi-**emulsan**, apo-psi-**emulsan**, beta-**emulsan**, or lipoheteropoly-saccharide.

ADVANTAGE - can be topically applied to skin or scalp for e.g. ameliorating dry skin conditions. @

L5 ANSWER 35 OF 50 MEDLINE DUPLICATE 12
ACCESSION NUMBER: 87183523 MEDLINE
DOCUMENT NUMBER: 87183523 PubMed ID: 3566271
TITLE: Reconstitution of emulsifying activity of Acinetobacter **calcoaceticus** BD4 **emulsan** by using pure polysaccharide and **protein**.

AUTHOR: Kaplan N; Zosim Z; Rosenberg E
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1987 Feb) 53 (2) 440-6.
Journal code: 6K6; 7605801. ISSN: 0099-2240.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198705
ENTRY DATE: Entered STN: 19900303
Last Updated on STN: 19900303
Entered Medline: 19870513

AB Acinetobacter **calcoaceticus** BD4 and BD413 produce extracellular emulsifying agents when grown on 2% ethanol medium. For emulsifying activity, both polysaccharide and **protein** fractions were required, as demonstrated by selective digestion of the polysaccharide with a specific bacteriophage-borne polysaccharide depolymerase, deproteinization of the extracellular emulsifying complex with hot phenol, and reconstitution of emulsifier activity with pure polysaccharide and a polysaccharide-free **protein** fraction. Chemical modification of the carboxyl groups in the polysaccharide resulted in a loss of activity. The **protein** required for reconstitution of emulsifying activity was purified sevenfold. The BD4 **emulsan** apparently derives its amphipathic properties from the association of an anionic hydrophilic polysaccharide with **proteins**.

L5 ANSWER 36 OF 50 WPIDS COPYRIGHT 2001 DERWENT INFORMATION LTD
ACCESSION NUMBER: 1986-107809 [17] WPIDS
CROSS REFERENCE: 1987-293661 [42]
DOC. NO. CPI: C1986-046002
TITLE: Soap and shampoo contg. microbial bio-emulsifier - pref. from Acinetobacter **calcoaceticus**, to improve stability and for treating psoriasis, acne etc..
DERWENT CLASS: B04 D16 D21
INVENTOR(S): HAYES, M E; HOLZNER, G
PATENT ASSIGNEE(S): (EMUL-N) EMULSAN BIOTECHNOLOGIES INC; (FIRM) FIRMENICH SA; (PETR-N) PETRO FERMENTATIONS
COUNTRY COUNT: 14
PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG
EP 178443	A	19860423	(198617)*	EN	33
R: AT BE CH DE FR GB IT LI LU NL SE					
JP 61241399	A	19861027	(198649)		

CA 1266238 A 19900227 (199015)
EP 178443 B1 19920610 (199224) EN 14
R: AT BE CH DE FR GB IT LI LU NL SE
DE 3586194 G 19920716 (199230)
JP 06062993 B2 19940817 (199431) 11

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
JP 61241399	A	JP 1985-228997	19851016
EP 178443	B1	EP 1985-111171	19850904
DE 3586194	G	DE 1985-3586194	19850904
		EP 1985-111171	19850904
JP 06062993	B2	JP 1985-228997	19851016

FILING DETAILS:

PATENT NO	KIND		PATENT NO
DE 3586194	G	Based on	EP 178443
JP 06062993	B2	Based on	JP 61241399

PRIORITY APPLN. INFO: US 1984-662931 19841016; US 1986-852272 19860415

AN 1986-107809 [17] WPIDS
CR 1987-293661 [42]
AB EP 178443 A UPAB: 19940928
A skin or hair cleansing compsn. is improved by adding 0.02-0.5 wt.% of a microbial bioemulsifier (I). (I) concentrates at the hydrocarbon (A)-water interface, so surrounds (A) droplets in (A)-in-water emulsions and maintains emulsion stability by preventing coalescence of the droplets. Pref. (I) is prod. by Acinetobacter **calcoaceticus** ATCC 31012, NRRL B-15616, B-15847, B-15848, B-15849, B-15850 or B-15860, and esp. in an alpha- or beta-**emulsan** or a lipoheteropolysaccharide biopolymer, esp. the viscoemulsan from ATCC 31926.

USE/ADVANTAGE - (I) can be incorporated into bar or liq. soaps, and into shampoos. Soaps contg. (I) provide a creamy lather and leave the skin feeling smooth. Shampoos contg. (I) provide better degreasing and cleansing power for residues left on the hair by fixatives, and leave the hair conditioned with improved shine. Washing with compsns. contg. (I) is also useful for treatment of dermatitis, acne, psoriasis, eczema, razor burn and dandruff.
0/0
Dwg.0/0
ABEQ DE 3586194 G UPAB: 19930922
A skin or hair cleansing compsn. is improved by adding 0.02-0.5 wt.%

of a microbial bioemulsifier (I). (I) concentrates at the hydrocarbon (A)-water interface, so surrounds (A) droplets in (A)-in-water emulsions and maintains emulsion stability by preventing coalescence of the droplets. Pref. (I) is prod. by Acinetobacter **calcoaceticus** ATCC 31012, NRRL B-15616, B-15847, B-15848, B-15849, B-15850 or B-15860, and esp. in an alpha- or beta-**emulsan** or a lipoheteropolysaccharide biopolymer, esp. the viscoemulsan from ATCC 31926.

USE/ADVANTAGE - (I) can be incorporated into bar or liq. soaps, and into shampoos. Soaps contg. (I) provide a creamy lather and leave the skin feeling smooth. Shampoos contg. (I) provide better degreasing and cleansing power for residues left on the hair by fixatives, and leave the hair conditioned with improved shine. Washing with compsns. contg. (I) is also useful for treatment of dermatitis, acne, psoriasis, eczema, razor burn and dandruff.

ABEQ EP 178443 B UPAB: 19930922

A composition containing from 0.02 to 0.5% by weight of a bioemulsifier produced by a **bacterium** of the Acinetobacter **calcoaceticus** species, for its use as an active pharmaceutical substance.

L5 ANSWER 37 OF 50 EMBASE COPYRIGHT 2001 ELSEVIER SCI. B.V.

ACCESSION NUMBER: 86150301 EMBASE

DOCUMENT NUMBER: 1986150301

TITLE: Role for **emulsan** in growth of Acinetobacter **calcoaceticus RAG-1** on crude oil.

AUTHOR: Pines O.; Gutnick D.

CORPORATE SOURCE: Department of Microbiology, George S. Wise Faculty of Life Sciences, Tel Aviv University, Ramat Aviv, Israel

SOURCE: Applied and Environmental Microbiology, (1986) 51/3 (661-663).
CODEN: AEMIDF

COUNTRY: United States

DOCUMENT TYPE: Journal

FILE SEGMENT: 046 Environmental Health and Pollution Control
004 Microbiology

LANGUAGE: English

AB When Acinetobacter **calcoaceticus RAG-1** was grown together with an **emulsan**-deficient mutant on crude oil, only the **emulsan**-producing **RAG-1** was found to grow, regardless of whether the medium was supplemented with **emulsan**. The results suggested that the cell-associated form of the bioemulsifier is the biologically active species required for growth on crude oil. A revertant of an **emulsan**-deficient strain was isolated which simultaneously regained the ability to produce both cell-associated and cell-free

emulsan as well as the ability to grow on crude oil.

L5 ANSWER 38 OF 50 MEDLINE
ACCESSION NUMBER: 86267731 MEDLINE
DOCUMENT NUMBER: 86267731 PubMed ID: 3089157
TITLE: Enhanced **emulsan** production in mutants of Acinetobacter **calcoaceticus RAG-1** selected for resistance to cetyltrimethylammonium bromide.
AUTHOR: Shabtai Y; Gutnick D L
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1986 Jul) 52 (1) 146-51.
Journal code: 6K6; 7605801. ISSN: 0099-2240.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198608
ENTRY DATE: Entered STN: 19900321
Last Updated on STN: 19900321
Entered Medline: 19860821

AB Mutants of Acinetobacter **calcoaceticus RAG-1** that produced elevated levels of the polymeric bioemulsifier **emulsan** were isolated on the basis of their resistance to the cationic surfactant cetyltrimethylammonium bromide (CTAB). Such mutants showed maximum enhancement in both overall yield and specific productivity of some two- to threefold over that of the wild type. In addition, the effect was also observed in a resting cell system in the presence of chloramphenicol, indicating that the mutation is not simply the result of faster growth. When CTAB-tolerant mutants were subjected together with the sensitive parent to the detergent under growing conditions, only the mutants were found to grow. The results suggest that the mutation for CTAB resistance leads to enhanced capsule production. This was confirmed quantitatively by a specific enzyme-linked immunosorbent assay for the cell-bound **emulsan** minicapsule.

L5 ANSWER 39 OF 50 MEDLINE
ACCESSION NUMBER: 85130800 MEDLINE
DOCUMENT NUMBER: 85130800 PubMed ID: 3838301
TITLE: Exocellular esterase and **emulsan** release from the cell surface of Acinetobacter **calcoaceticus**.
AUTHOR: Shabtai Y; Gutnick D L
SOURCE: JOURNAL OF BACTERIOLOGY, (1985 Mar) 161 (3) 1176-81.
Journal code: HH3; 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198504
ENTRY DATE: Entered STN: 19900320
Last Updated on STN: 19900320
Entered Medline: 19850408

AB An esterase activity has been found, both in the cell-free growth medium and on the cell surface of the hydrocarbon-degrading Acinetobacter **calcoaceticus RAG-1**. The enzyme catalyzed the hydrolysis of acetyl and other acyl groups from triglycerides and aryl and alkyl esters. **Emulsan**, the extracellular heteropolysaccharide bioemulsifier produced by strain **RAG-1**, was also a substrate for the enzyme. Gel filtration showed that the cell-free enzyme was released from the cell surface either **emulsan** free or associated with the bioemulsifier. The partially purified enzyme was found to interact specifically with the esterified fully active **emulsan**, but not with the deesterified polymer. A role for esterase in **emulsan** release from the cell surface was indicated when the enzyme was preferentially depleted from the cell surface under conditions in which **emulsan** was not released. Such cells lost the capacity to release the biopolymer.

L5 ANSWER 40 OF 50 MEDLINE
ACCESSION NUMBER: 85147695 MEDLINE
DOCUMENT NUMBER: 85147695 PubMed ID: 3838426
TITLE: Tolerance of Acinetobacter **calcoaceticus RAG-1** to the cationic surfactant cetyltrimethylammonium bromide: role of the bioemulsifier **emulsan**.
AUTHOR: Shabtai Y; Gutnick D L
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1985 Jan) 49 (1) 192-7.
Journal code: 6K6; 7605801. ISSN: 0099-2240.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198504
ENTRY DATE: Entered STN: 19900320
Last Updated on STN: 19900320
Entered Medline: 19850416

AB **Emulsan**, the polyanionic heteropolysaccharide bioemulsifier produced by Acinetobacter **calcoaceticus RAG-1**, was found to enhance the tolerance of **RAG-1** cells to the toxic effects of the cationic detergent cetyltrimethylammonium bromide (CTAB). **Emulsan** -mediated tolerance was obtained with the purified deproteinated

apoemulsan; ca. 9 micrograms of apoemulsan neutralized 1 microgram of CTAB. Deesterified apoemulsan was only half as effective in protecting the cells from CTAB toxicity. Tolerance was also mediated by the cell-associated **emulsan** minicapsule. Mutants lacking this capsule were more sensitive to CTAB than the corresponding parent. The growth of mutants and parent cells in mixed-culture experiments demonstrated that the cell-associated polymer mediates CTAB tolerance in the early stages of growth. Once sufficient cell-free polymer has been released into the aqueous medium (ca. 0.5 micrograms/ml), this extracellular **emulsan** also plays a role in CTAB tolerance.

L5 ANSWER 41 OF 50 MEDLINE DUPLICATE 13
ACCESSION NUMBER: 84087701 MEDLINE
DOCUMENT NUMBER: 84087701 PubMed ID: 6546308
TITLE: Specific binding of a bacteriophage at a hydrocarbon-water interface.
AUTHOR: Pines O; Gutnick D
SOURCE: JOURNAL OF BACTERIOLOGY, (1984 Jan) 157 (1) 179-83. Journal code: HH3; 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198402
ENTRY DATE: Entered STN: 19900319
Last Updated on STN: 19900319
Entered Medline: 19840222

AB **Emulsan**, the extracellular polyanionic emulsifying agent produced by Acinetobacter **calcoaceticus RAG-1**, has been implicated as a receptor for a specific virulent **RAG-1** bacteriophage, ap3. Aqueous solutions of **emulsan** did not interfere with phage ap3 adsorption to **RAG-1** cells. However, binding of phage ap3 occurred at the interfaces of hexadecane-in-water emulsions specifically stabilized by **emulsan** polymers. Binding of ap3 to emulsions was inhibited either in the presence of anti-**emulsan** antibodies or in the presence of a specific **emulsan** depolymerase. Moreover, when the phage was first bound to **emulsan**-stabilized emulsions and the emulsions subsequently treated with **emulsan** depolymerase, viable phage was released, indicating that phage ap3 DNA ejection was not triggered by binding. The results indicate that **emulsan** functions as the ap3 receptor and suggest that to function as a receptor, **emulsan** assumes a specific conformation conferred on it by its specific interaction with hydrophobic surfaces.

L5 ANSWER 42 OF 50 MEDLINE
ACCESSION NUMBER: 83293345 MEDLINE
DOCUMENT NUMBER: 83293345 PubMed ID: 6688443
TITLE: Immunochemical identification of the major cell surface agglutinogen of Acinetobacter **calcoaceticus** RAG-92.
AUTHOR: Bayer E A; Skutelsky E; Goldman S; Rosenberg E; Gutnick D L
CONTRACT NUMBER: F32-ES5210 (NIEHS)
SOURCE: JOURNAL OF GENERAL MICROBIOLOGY, (1983 Apr) 129 (Pt 4) 1109-19.
Journal code: I87; 0375371. ISSN: 0022-1287.
PUB. COUNTRY: ENGLAND: United Kingdom
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198310
ENTRY DATE: Entered STN: 19900319
Last Updated on STN: 19970203
Entered Medline: 19831028

AB The immunochemical and immunocytochemical characteristics of three Acinetobacter **calcoaceticus** RAG strains were compared in order to clarify the relationship between antibody-induced agglutination and the production of polyanionic extracellular emulsifier (termed **emulsan**). In addition to the parent, RAG-92, two mutant strains were examined: (1) a non-agglutinating **emulsan**-producer (AB15), and (2) an agglutinating mutant (16TLU) defective in the production of **emulsan**. A combined genetic-immunochemical approach was employed. This included the comparison of crossed immunoelectrophoresis patterns of parent and mutant supernates and the effect of absorption of anti-whole cell antiserum with mutant cells. In addition, agglutinability and competition studies were performed as well as electron microscopic cytochemistry. The results demonstrated that three major antigenic components were associated with the cell surface and the supernate. Mutant cells were altered both in their cell surface properties and in their extracellular products. One antigenic component, termed component C3, was the major cell surface agglutinogen; this component was absent in non-agglutinating mutants. Component C3 may be identical with or attached to the 300 nm projections on the parent cell surface, but it is not directly related to the presence of **emulsan**. It appears that **emulsan** plays little or no role in the phenomenon of antibody-induced agglutination of this organism.

L5 ANSWER 43 OF 50 MEDLINE DUPLICATE 14
ACCESSION NUMBER: 83184628 MEDLINE
DOCUMENT NUMBER: 83184628 PubMed ID: 6341225

TITLE: Inhibition of **bacterial** adherence to hydrocarbons and epithelial cells by **emulsan**

AUTHOR: Rosenberg E; Gottlieb A; Rosenberg M

SOURCE: INFECTION AND IMMUNITY, (1983 Mar) 39 (3) 1024-8.
Journal code: GO7; 0246127. ISSN: 0019-9567.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198306
ENTRY DATE: Entered STN: 19900318
Last Updated on STN: 19900318
Entered Medline: 19830623

AB Acinetobacter **calcoaceticus RAG-1** and BD413, as well as Streptococcus pyogenes M-5, adhered to octane. Adherence was inhibited by **emulsan** (100 micrograms/ml), the polymeric emulsifying agent produced by A. **calcoaceticus RAG-1**. **Emulsan** also inhibited adherence of S. pyogenes and **RAG-1** to buccal epithelial cells. The mean values of bound S. pyogenes per epithelial cell were 57.2 and 20.7 for the control and **emulsan**-containing suspensions, respectively; mean values of bound **RAG-1** per epithelial cell were 221 for the control and 40 for the suspension containing 100 micrograms of **emulsan** per ml. Desorption of previously bound **RAG-1** from epithelial cells by **emulsan** was concentration dependent: a maximum of 80% desorption was obtained with 200 micrograms of **emulsan** per ml. The data showing that **emulsan** desorbed 70% of the indigenous **bacterial** flora from buccal epithelial cells suggest that hydrophobic interactions mediate not only the in vitro adherence of laboratory strains to epithelial cells, but actually govern the adherence of the majority of the **bacteria** that colonize this surface. The advantages of using **emulsan** as an antiadherence agent include its chemical purity, stability, and polymeric nature.

L5 ANSWER 44 OF 50 MEDLINE DUPLICATE 15

ACCESSION NUMBER: 83186045 MEDLINE
DOCUMENT NUMBER: 83186045 PubMed ID: 6687725

TITLE: Localization of **emulsan**-like polymers associated with the cell surface of acinetobacter **calcoaceticus**.

AUTHOR: Pines O; Bayer E A; Gutnick D L

CONTRACT NUMBER: F32-ES5210 (NIEHS)
SOURCE: JOURNAL OF BACTERIOLOGY, (1983 May) 154 (2) 893-905.
Journal code: HH3; 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States

Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198306
ENTRY DATE: Entered STN: 19900318
Last Updated on STN: 19970203
Entered Medline: 19830617

AB Various immunochemical techniques were employed to probe the relationship between the extracellular emulsifying agent (**emulsan**) and the cell-associated form of the polymer in Acinetobacter **calcoaceticus RAG-1**.
Using an **emulsan**-specific antibody preparation, immunocytochemical labeling revealed that an **emulsan**-like **antigen** is a major component of the 125-nm minicapsule which envelopes the exponential-phase cell of the parent strain. The marked reduction of this capsule in stationary-phase cells was correlated with the production of extracellular emulsifying activity. Crossed immunoelectrophoresis techniques demonstrated that the major antigenic component (S1) of the culture supernatant fluid is immunochemically identical to purified **emulsan**, yet electrophoretically distinct. The characteristics of the parent strain were compared with those of two phage-resistant mutant strains which are defective in extracellular **emulsan** production. One of these mutants, termed TR3, lacked both the **emulsan**-like capsule on the cell surface and the extracellular S1 component. A second phage-resistant **emulsan** -defective mutant (TL4) was characterized by an antigenically altered and inactive form of extracellular **emulsan**. A relatively small amount of **emulsan**-like capsular material was consistently demonstrated on the cell surface of this mutant. The correlation between phage sensitivity and extracellular **emulsan** production was strengthened by the fact that **emulsan**-specific antibodies inhibited both emulsification activity and phage adsortion onto cells of the parent strain.

L5 ANSWER 45 OF 50 MEDLINE DUPLICATE 16
ACCESSION NUMBER: 84051125 MEDLINE
DOCUMENT NUMBER: 84051125 PubMed ID: 6688940
TITLE: **Bacterial** degradation of **emulsan**.
AUTHOR: Shoham Y; Rosenberg M; Rosenberg E
SOURCE: APPLIED AND ENVIRONMENTAL MICROBIOLOGY, (1983 Sep) 46 (3) 573-9.
Journal code: 6K6; 7605801. ISSN: 0099-2240.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198312

ENTRY DATE: Entered STN: 19900319
Last Updated on STN: 19900319
Entered Medline: 19831217

AB **Emulsan** is a polyanionic heteropolysaccharide bioemulsifier produced by Acinetobacter **calcoaceticus RAG-1**. A mixed **bacterial** population was obtained by enrichment culture that was capable of degrading **emulsan** and using it as a carbon source. From this mixed culture, an **emulsan**-degrading **bacterium**, termed YUV-1, was isolated. Strain YUV-1 is an aerobic, gram-negative, non-spore-forming, rod-shaped **bacterium** which grows best in media containing yeast extract. When placed on preformed lawns of A. **calcoaceticus RAG-1**, strain YUV-1 produced translucent plaques which grew in size until the entire plate was covered. Plaque formation was due to solubilization of the **emulsan** capsule of **RAG-1**. Plaque formation was not observed on **emulsan**-negative mutants of **RAG-1**. As a consequence of the solubilization of the **emulsan** capsule, **RAG-1** cells became more hydrophobic, as determined by adherence to hexadecane. Growth of YUV-1 on a medium containing yeast extract and **emulsan** was biphasic. During the initial 24 h, cell concentration increased 10-fold, but **emulsan** was not degraded; during the lag in growth (24 to 48 h), **emulsan** was inactivated and depolymerized but not consumed; during the second growth phase (48 to 70 h) the depolymerized **emulsan** products were consumed.

L5 ANSWER 46 OF 50 MEDLINE DUPLICATE 17
ACCESSION NUMBER: 84008023 MEDLINE
DOCUMENT NUMBER: 84008023 PubMed ID: 6688620
TITLE: Enzymatic depolymerization of **emulsan**.
AUTHOR: Shoham Y; Rosenberg E
SOURCE: JOURNAL OF BACTERIOLOGY, (1983 Oct) 156 (1) 161-7.
Journal code: HH3; 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198311
ENTRY DATE: Entered STN: 19900319
Last Updated on STN: 19970203
Entered Medline: 19831123

AB **Emulsan**, the polyanionic emulsifying agent synthesized by Acinetobacter **calcoaceticus RAG-1**, was depolymerized by an enzyme obtained from a soil **bacterium** YUV-1. The extracellular **emulsan** depolymerase was produced when strains **RAG-1** and YUV-1 were grown together

on agar medium. The enzyme was extracted from the agar and concentrated by ultrafiltration and ammonium sulfate precipitation. The molecular weight of the enzyme was estimated to be 89,000. **Emulsan** depolymerase activity was due to an eliminase reaction which split glycosidic linkages within the heteropolysaccharide backbone of **emulsan** to generate reducing groups and alpha, beta-unsaturated uronides with an absorbance maximum of 233 nm. Deesterified **emulsan** was degraded by **emulsan** depolymerase at only 27% of the rate of the native polymer. The treatment of **emulsan** solutions with **emulsan** depolymerase for brief periods caused a rapid and parallel drop in viscosity and emulsifying activity. More than 75% of the viscosity and emulsifying activity was lost at a time when less than 0.5% of the glycosidic linkages were broken. These data indicate that (i) **emulsan** depolymerase is an endoglycosidase and (ii) the higher the molecular weight of **emulsan**, the greater its emulsifying activity. Exhaustive digestion of **emulsan** with **emulsan** depolymerase produced oligosaccharides with a number average molecular weight of about 3,000. The fractionation of the digest on Bio-Gel P-6 yielded four broad peaks. The pooled fractions from each of the peaks contained the same relative amounts of reducing sugar and had an absorbance at 233 nm. The molar ratio of esterified sugar to reducing groups was close to 2 in each fraction.

L5 ANSWER 47 OF 50 MEDLINE DUPLICATE 18
ACCESSION NUMBER: 83006996 MEDLINE
DOCUMENT NUMBER: 83006996 PubMed ID: 6896872
TITLE: **Emulsan** production by Acinetobacter **calcoaceticus** in the presence of chloramphenicol.
AUTHOR: Rubinovitz C; Gutnick D L; Rosenberg E
SOURCE: JOURNAL OF BACTERIOLOGY, (1982 Oct) 152 (1) 126-32.
Journal code: HH3; 2985120R. ISSN: 0021-9193.
PUB. COUNTRY: United States
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198212
ENTRY DATE: Entered STN: 19900317
Last Updated on STN: 19980206
Entered Medline: 19821203

AB When exponentially growing cultures of Acinetobacter **calcoaceticus RAG-1** or RAG-92 were either treated with inhibitors of **protein** synthesis or starved for a required amino acid, there was a stimulation in the production of **emulsan**, an extracellular polyanionic emulsifier. **Emulsan** synthesis in the presence of

chloramphenicol was dependent on utilizable sources of carbon and nitrogen and was inhibited by cyanide or azide or anaerobic conditions. Radioactive tracer experiments indicated that the enhanced production of **emulsan** after the addition of chloramphenicol was due to both the release of material synthesized before the addition of the antibiotic (40%) and de novo synthesis of the polymer (60%). Chemical analysis of **RAG-1** cells demonstrated large amounts of polymeric amino sugars; it was estimated that cell-associated **emulsan** comprised about 15% of the dry weight of growing cells. The data are consistent with the hypothesis that a polymeric precursor of **emulsan** accumulates on the cell surface during the exponential growth phase; in the stationary phase or during inhibition of **protein** synthesis, the polymer is released as a potent emulsifier.

L5 ANSWER 48 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1983:43743 BIOSIS
DOCUMENT NUMBER: BR24:43743
TITLE: RELATIONSHIP BETWEEN PHAGE RESISTANCE **EMULSAN** PRODUCTION AND THE CELL SURFACE OF ACINETOBACTER-**CALCOACETICUS RAG-1**.
AUTHOR(S): PINES O; BAYER E A; GUTNICK D L
CORPORATE SOURCE: DEP. MICROBIOL., GEORGE S. WISE FAC. LIFE SCI., TEL AVIV UNIV., RAMAT AVIV, ISR.
SOURCE: ANNUAL MEETING OF THE ISRAEL SOCIETY FOR MICROBIOLOGY, MT. SCOPUS, ISRAEL, DEC. 27-28, 1981. ISR J MED SCI, (1982) 18 (5), 26.
CODEN: IJMDAI. ISSN: 0021-2180.
DOCUMENT TYPE: Conference
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L5 ANSWER 49 OF 50 BIOSIS COPYRIGHT 2001 BIOSIS
ACCESSION NUMBER: 1982:50783 BIOSIS
DOCUMENT NUMBER: BR22:50783
TITLE: PRODUCTION OF **EMULSAN** DURING INHIBITION OF **PROTEIN** SYNTHESIS.
AUTHOR(S): RUBINOVITZ C; GUTNICK D L; ROSENBERG E
CORPORATE SOURCE: TEL AVIV UNIV., TEL AVIV.
SOURCE: ANNUAL MEETING OF THE ISRAEL BIOCHEMICAL SOCIETY, JERUSALEM, ISRAEL, APRIL 12-13, 1981. ISR J MED SCI, (1981) 17 (6), 481-482.
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ACCESSION NUMBER: 1982:211343 BIOSIS
DOCUMENT NUMBER: BA73:71327
TITLE: RELATIONSHIP BETWEEN PHAGE RESISTANCE AND **EMULSAN** PRODUCTION INTERACTION OF PHAGES WITH THE CELL SURFACE OF ACINETOBACTER-**CALCOACETICUS RAG-1**.
AUTHOR(S): PINES O; GUTNICK D L
CORPORATE SOURCE: GEORGE S. WISE FAC. LIFE SCI., TEL AVIV UNIV., RAMAT AVIV, ISR.
SOURCE: ARCH MICROBIOL, (1981) 130 (2), 129-133.
CODEN: AMICCW. ISSN: 0302-8933.
FILE SEGMENT: BA; OLD
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AB The hydrocarbon-degrading strain A. **calcoaceticus** **RAG-1** produces an extracellular emulsifying agent capable of forming stable oil-in-water emulsions. The bioemulsifier, termed **emulsan**, is a polyanionic heteropolysaccharide (MW 106) composed mainly of N-acyl-D-galactosamine and an N-acyl hexosamine uronic acid. To probe the interaction of **emulsan** with the cell surface prior to its release into the growth medium, 2 new virulent bacteriophages for A. **calcoaceticus** **RAG-1** were isolated from sewage and the properties of phage resistant mutants were studied. The 2 phages, ap-2 and ap-3, were differentiated on the basis of plaque morphology, EM and buoyant density. Isolated mutants of A. **calcoaceticus** **RAG-1** which were resistant to 1 of the 2 phages retained sensitivity to the other phage. Resistance to phage ap-3 was accompanied by a severe drop in **emulsan** production. Independently isolated derivatives of A. **calcoaceticus** **RAG-1** with a defect in **emulsan** production also turned out to be resistant towards phage ap-3. Antibodies prepared against purified **emulsan** specifically inhibited phage ap-3 adsorption to the cell surface of the parental strain.

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